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State Geological Survey

Trans. Series No. 1
Revised 1930

Great Lakes

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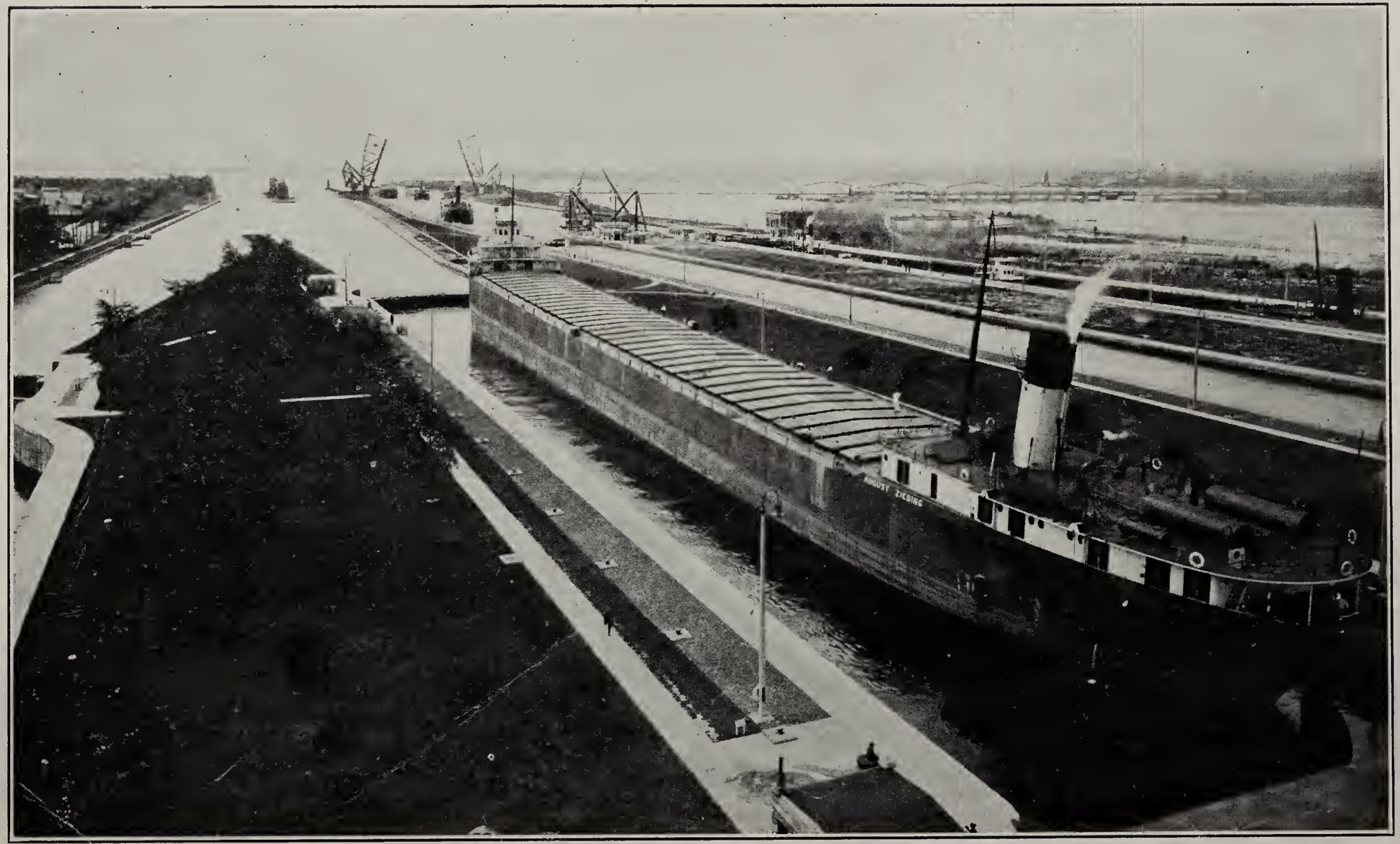

LOCKS AT ST. MARYS FALLS CANAL, MICH.

WAR DEPARTMENT
CORPS OF ENGINEERS, U. S. ARMY
AND
UNITED STATES SHIPPING BOARD

TRANSPORTATION SERIES No. 1

TRANSPORTATION ON THE GREAT LAKES

(Revised 1930)

Prepared by
THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS
WAR DEPARTMENT
and the
BUREAU OF OPERATIONS
UNITED STATES SHIPPING BOARD

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State Geological Survey

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LETTERS OF TRANSMITTAL

WAR DEPARTMENT,
March 12, 1930.

Subject: Report on transportation on the Great Lakes.
To: The Chief of Engineers, United States Army.

1. There is transmitted herewith a report on transportation on the Great Lakes, constituting No. 1 of the Transportation Series, prepared by this office in cooperation with the Bureau of Operations, United States Shipping Board, under authority of section 8 of the merchant marine act of June 5, 1920, and section 500 of the transportation act of February 28, 1920.

2. The present report is a revision of the original volume and contains data for the calendar year 1928. Much of the information for the revised report was supplied by the district engineers at Duluth, Milwaukee, Chicago, Detroit, and Buffalo, and the detailed data were consolidated and compiled by the statistical division of this office under the personal supervision of Mr. W. E. Graves, chief statistician of the board, who is in immediate charge of the joint program with the Shipping Board.

3. The report contains much information relative to Canadian commerce and facilities at Canadian ports between Halifax and Fort William-Port Arthur. Data are presented showing the movement of important bulk commodities on the Great Lakes, the volume of commerce, the facilities available for handling the traffic, and the rates and charges applying against it.

4. On account of the value of the information to commerce and shipping, and to the operation of the American merchant marine, it is recommended that the report be published, with the accompanying illustrations.

For the board:

J. J. LOVING,
Lieut. Col., Corps of Engineers,
Resident Member of the Board.

[First indorsement]

OFFICE OF THE CHIEF OF ENGINEERS,
March 12, 1930.

To: The Board of Engineers for Rivers and Harbors, Washington, D. C.

Approved.

LYTLE BROWN,
Major General, Chief of Engineers.

MARCH 19, 1930.

MR. GEORGE PARSON,
Director, Bureau of Operations,
United States Shipping Board, Washington, D. C.

DEAR SIR: Due to the commercial importance of the Great Lakes and their connecting channels, the port facilities division of the Shipping Board's bureau of operations, acting in conjunction with the Board of Engineers for Rivers and Harbors of the War Department, prepared in 1925 a report entitled "Transportation on the Great Lakes."

This publication contained the results of a comprehensive study of the movement of grain, coal, and other bulk freight, package freight, and car-ferry traffic. In addition to the foregoing, there was a general description of the Great Lakes and connecting waterways, a chapter on the treaties, laws, and regulations affecting navigation, and an analysis of the commerce of the principal lake ports.

In connection with the grain movement, the report showed the production of grain in the United States and Canada, the production of individual States and Provinces tributary to the Great Lakes, the movements to upper lake ports, the movements on the Lakes and to North Atlantic ports, the vessels available for the handling of grain, elevator charges, and the rail and water rates in effect on grain from interior shipping points to lake ports and to seaboard. The chapters on the movement of ore and coal gave similar detailed information.

The report contained numerous pictures, maps, and graphs which showed direction and volume of the flow of important commodities moving over the Great Lakes system.

Since the original volume was published, much of the information has become obsolete, and it has therefore been deemed advisable to revise the entire volume in order to incorporate new statistics, new descriptions, new regulations, and details as to new practices.

The joint force of the Shipping Board and War Department having recently completed a revision of the work, I transmit same herewith and recommend that it be approved and published.

Respectfully,

SAMUEL R. HOWELL,
In Charge Domestic Port Surveys,
Port Facilities Division, Bureau of Operations,
United States Shipping Board.

Approved.

GEORGE PARSON,
Director, Bureau of Operations,
United States Shipping Board.

INTRODUCTION

Under the provisions of section 500 of the transportation act of February 28, 1920, and section 8 of the merchant marine act of June 5, 1920, the Board of Engineers for Rivers and Harbors and the bureau of operations, United States Shipping Board, are jointly making investigations of transporattion and shipping conditions in the United States as affecting the use of our ports and water routes. The reports prepared as the result of these investigations are being published as the Transportation Series, of which Transportation on the Great Lakes was the first to be issued. In 1927 an interim report on transportation on the Ohio River system was issued showing the importance to the country of the improvements completed and in progress in the Ohio Valley. The more complete report covering transportation in the Mississippi and Ohio Valleys, constituting No. 2 of the Transportation Series, was issued in 1929.

This volume is a revision of the original report and contains data for the calendar year 1928. It is devoted to a presentation of data showing the movement of commerce on the Great Lakes and their tributary channels, the facilities available for handling this commerce, and the rates and charges applying against it. Much of the information for the revised report was supplied by the district engineers at Duluth, Milwaukee, Chicago, Detroit, and Buffalo, supplemented by data collected by representatives of the joint force who made personal surveys of all the Canadian and American ports. The final report was consolidated and compiled by the joint force under the supervision of Mr. W. E. Graves, chief statistician of the board, who is in immediate charge of these investigations.

Acknowledgment is gratefully made of the valuable data furnished by the board of grain commissioners for Canada, the Dominion Bureau of Statistics, and by various individuals and officials at Canadian ports. Without such cooperation it would have been impossible to present a complete record of the flow of commerce on the Great Lakes and their tributary channels. Much valuable information for the report was also furnished by the Cleveland Ore and Coal Exchange, the Ohio Bureau of Coal Statistics, Brookings Institute, the Bureau of Mines, Department of Commerce, various port organizations, and the rail carriers serving the ports.

I. GENERAL DESCRIPTION OF THE GREAT LAKES AND THEIR CONNECTING CHANNELS AND HARBORS

The Great Lakes and their connecting channels form a natural transportation highway having a water surface area of over 95,000 square miles, and a shore line of over 8,300 miles. From Montreal, which is at the head of deep draft ocean navigation on the St. Lawrence River, the sailing distance to the head or westerly end of Lake Superior is about 1,340 miles, and to the head or south end of Lake Michigan, about 1,260 miles. In each case about 1,000 miles of the distance are through the open lakes. The Great Lakes and their connecting channels afford access to a region notable for the magnitude of its natural and industrial resources. In point of volume and importance of traffic, this lake group has no equal as an inland route for water-borne commerce.

THE GREAT LAKES SYSTEM

The Great Lakes, comprising Lakes Superior, Huron, St. Clair, Erie, and Ontario, situated between the United States and Canada, and Lake Michigan, lying wholly within the United States, differ from the high seas in that the latter have diurnal tides while the former have periodic and seasonal stage cycles. Lake Superior, the largest of these lakes, has a length, from Duluth to Point Iroquois, of 383 miles and a breadth of approximately 160 miles. Its maximum recorded depth is 1,180 feet. The outlet of this lake is the St. Marys River. The length of Lake Michigan is approximately 321 miles; its breadth, 118 miles, and its maximum measured depth 870 feet. Lake Huron is about 223 miles long and 101 miles wide, with a maximum measured depth of 750 feet. Lakes Michigan and Huron are connected by the Strait of Mackinac, and their outlet is the St. Clair River. Lake St. Clair is approximately 26 miles long and 24 miles wide; its maximum depth is less than 24 feet, except at its outlet at the head of Detroit River. Lake Erie is about 240 miles in length, with a maximum width of 57 miles; its maximum depth as recorded by the United States Lake Survey is 210 feet. Niagara River is the outlet of this lake. Lake Ontario is about 180 miles long, 53 miles wide, and has a maximum recorded depth of 738 feet. The natural outlet of this lake, as well as of the entire Great Lakes system, is the St. Lawrence River.

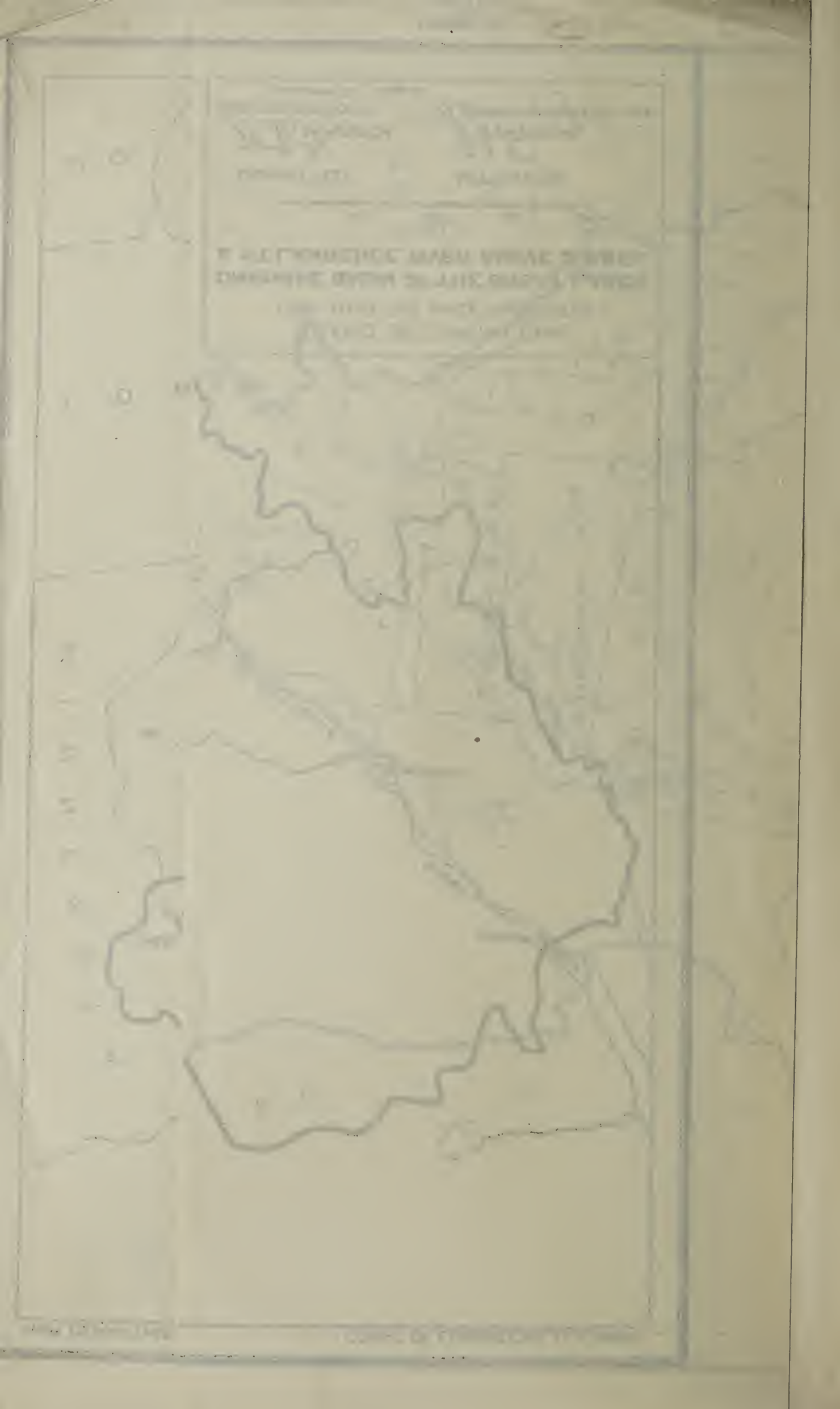
The areas of the surfaces of the Great Lakes and their watersheds, as determined by the United States Lake Survey, are shown in the following table:

TABLE NO. 1.—*Surface areas of Great Lakes and watersheds*

Lake	Area of lake surface in square miles	Drainage area including lake surface in square miles	Mean level, feet above mean tide at New York	Drop in elevation from lake next above, feet	Connecting waterway
Superior	31,820	80,900	602.23	Summit.	
Michigan	22,400	69,040	580.93	21.30	St. Marys River.
Huron	23,010	72,420	580.93	21.30	
St. Clair	460	6,420	575.47	5.46	St. Clair River.
Erie	9,940	34,680	572.42	3.05	Detroit River.
Ontario	7,540	34,630	246.09	326.33	Niagara River.

Original conditions.—Prior to the initiation of improvements for the benefit of navigation on the Great Lakes, through traffic was restricted by physical conditions to Lakes Erie, Huron, and Michigan. Communication with Lake Superior was rendered impracticable by the Falls of St. Marys River, having a drop of about 20 feet, and communication between Lake Erie and Lake Ontario was blocked by the Falls of the Niagara. Prior to 1832, Detroit was the western terminus of most of the lake traffic, except that of fur traders and military posts. It is said that the Black Hawk War which broke out in that year was one means of diffusing knowledge of Illinois and Wisconsin throughout the East and helped to accelerate the settlement of the country on the west shore of Lake Michigan, which was followed by an extension of traffic to Lake Michigan.

St. Marys River.—Originally St. Marys River, connecting Lakes Huron and Superior, was obstructed by St. Marys Falls, and by a number of shoals upon which the least depths were from 5 to 17 feet at mean low water. Navigation past the falls was impracticable except for down-bound canoes and log rafts. A small canal was built on the Canadian side by the Northwest Fur Co. in 1797–98, which provided a depth of about 2 feet. This canal was destroyed in 1814. Thereafter until 1855 the movement of freight to and from Lake Superior was by boat to Sault Ste. Marie, where cargoes were unloaded, taken across the portage 1 mile long, and reloaded on boats. In 1855 the State of Michigan completed a canal with a double lift lock, providing a channel for vessels having a draft of 11.5 feet at mean stage of water, thus establishing the first through navigation route to Lake Superior. This canal was taken over by the United States in 1881, and in 1888 the original locks were destroyed in making the excavation for the present Poe Lock, which is 800 feet long, 100 feet wide, and has a controlling depth of 18 feet on the sills. This lock was completed in 1896. The Weitzel Lock, built in the



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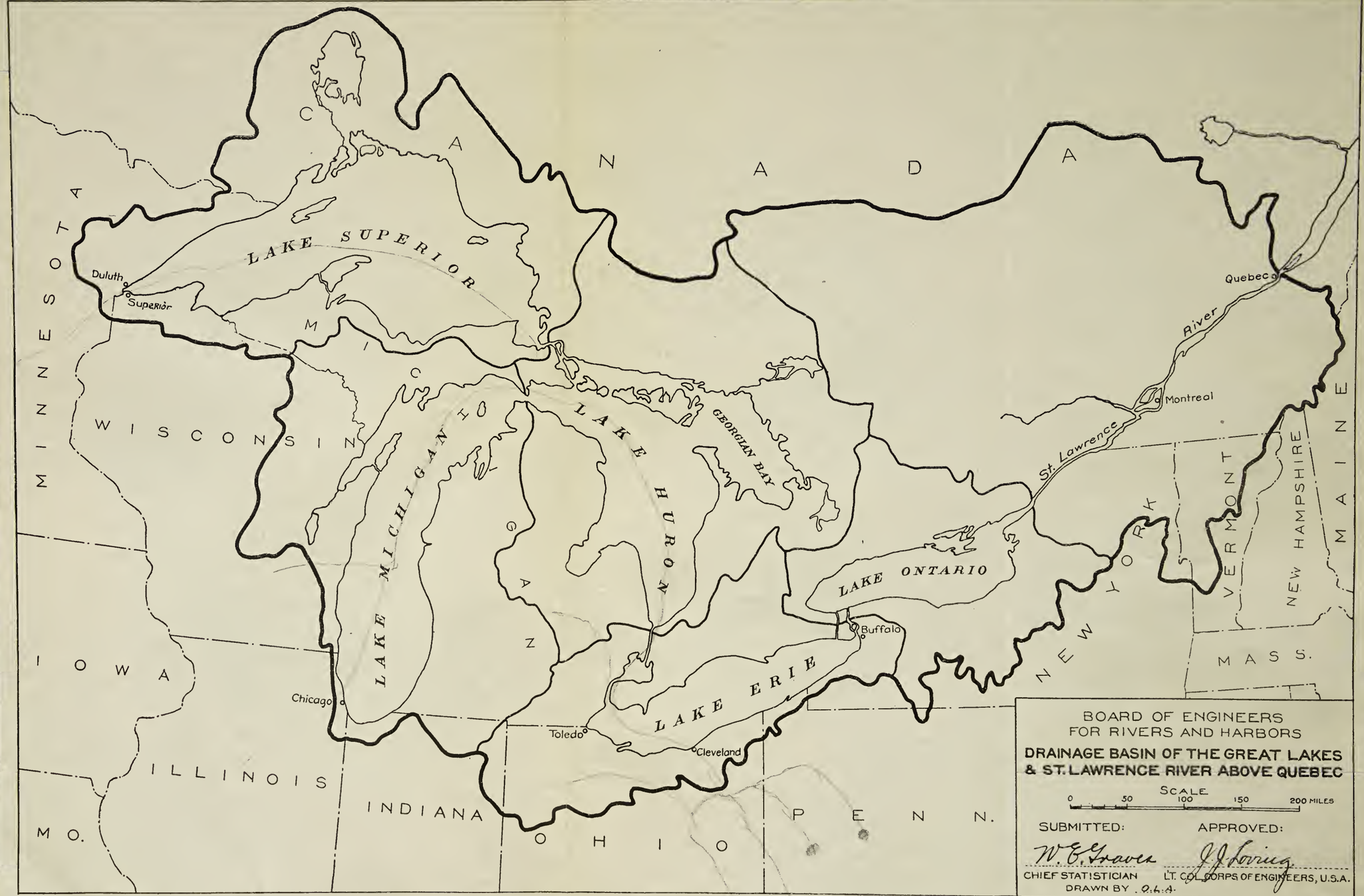
WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.ARMY.



BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

DRAINAGE BASIN OF THE GREAT LAKES & ST. LAWRENCE RIVER ABOVE QUEBEC

SCALE
0 50 100 150 200 MILES

SUBMITTED: W. E. Graves
CHIEF STATISTICIAN

APPROVED: J. J. Loring
LT. COL. CORPS OF ENGINEERS, U.S.A.

DRAWN BY O.L.A.

103996—30. (Face p. 2.)

years 1870 to 1881, is 515 feet long, 80 feet wide in the chamber, narrowing to 60 feet at the gates, and has a controlling depth of 12.6 feet of water on the sills. The Davis or third lock opened in 1914, and the Sabin or fourth lock opened in 1919, are 1,300 feet long, 80 feet wide, and have 24.5 feet on the sills. The existing project for the improvement of the St. Marys River provides for a depth of 21 feet at low water, over a minimum width of 300 feet for 1-way traffic and of 600 feet for 2-way traffic throughout the river. The project depth of the South Canal is 24 feet, and of the North Canal 24½ feet. At the present time the dredged areas afford a least width of 300 feet, increasing angles and other critical places up to 1,000 feet.

In addition to the improvements made by the United States at St. Marys Falls, the Dominion of Canada between the years 1888 and 1895 constructed a canal 1⅛ miles long, 150 feet wide, with a lock 900 feet long and 60 feet wide, having a depth of 18 feet 3 inches on the sills at lowest known water level.

St. Clair River, Mich.—The St. Clair River connects Lake Huron and Lake St. Clair, and has a total fall of 5.8 feet in its length of 40 miles. With the exception of the delta section which begins about 33 miles below the head of the river, the width averages about 2,000 feet. It discharges into Lake St. Clair through seven mouths, the one known as the South Channel being used for deep-draft vessels, while several other channels are used for small craft. The least depths above the mouths of the river were suitable for vessels plying these waters during the early period of lake navigation. The existing project provides for channels 20, 21, and 22 feet deep at low water through various sections.

Lake St. Clair, Mich.—Lake St. Clair is the smallest of the Great Lakes, being about 460 square miles in area, and is shallow throughout. On the sailing course it is 18 miles wide. Originally the channels through the lake were obstructed by a shoal at the entrance to the Detroit River and by bars at the several mouths of the St. Clair River. According to a report of conditions in 1846, lighters were used at the latter point to relieve boats of some of their freight, thus enabling them to pass with greater safety over the shallow places. The existing project provides for a ship canal known as St. Clair Flats Canal, consisting of two dredged cuts each 300 feet wide, the westerly 21 feet deep, and the easterly 20 feet deep, extending from deep water in St. Clair River, a distance of 17,460 feet, into Lake St. Clair; and for a channel 800 feet wide and 20 to 21 feet deep through the shoal at the entrance to the Detroit River, known as Grosse Pointe Channel.

Detroit River.—The Detroit River connects Lakes St. Clair and Erie and is 28 miles long. The total fall is about 3 feet, most of which occurs in the length of about 5 miles in the lower portion of the

river. The width of the river varies from one-half mile to about 3 miles. In its original condition the river was navigable throughout its entire length, but the shoals at Limekiln Crossing, about 8 miles above Detroit River Lighthouse, limited the usable depth to 12½ to 15 feet at Lake Erie stage over a bottom of solid rock. The existing project provides for a channel known as Amherstburg Channel, at least 600 feet wide, with a depth of 22 feet north of its junction with the Livingstone Channel, and of 21 feet south of said junction; and for a second channel known as Livingstone Channel, with a least depth of 22 feet and a least width of 800 feet from deep water in Lake Erie to Bar Point, and a least width of 450 feet thence to its junction with the Amherstburg Channel. The project also provides for a channel 22 feet deep and 800 feet wide abreast of Fighting Island, and for removing the shoal at the head of Grosse Isle. The Amherstburg Channel is for upbound traffic and the Livingstone Channel is for down-bound traffic.

The Welland Canal.—To overcome the barrier to traffic formed by Niagara Falls the Dominion of Canada constructed the Welland Canal, extending from Port Colborne on Lake Erie to Port Dalhousie on Lake Ontario. The canal is 26¾ miles long and has a total descent of 326¾ feet, overcome by 25 lift locks each 270 feet long, with an available length of 255 feet, a width of 45 feet, and a depth of about 14 feet on the sills. In order to provide accommodation for larger vessels, operations were begun in 1913 for the construction of a new ship canal between Lakes Erie and Ontario. The line of the proposed canal follows the course of the present canal from Port Colborne to Allanburg, about halfway across the peninsula; thence an entirely new channel will be provided and the canal will enter Lake Ontario at Port Weller, about 3 miles east of the terminus of the present canal. The total length of the new line is 25 miles, and the difference in elevation between the two lakes, about 325½ feet, will be overcome by seven lift locks, each having a lift of 46½ feet. The locks will be 820 feet in length by 80 feet in width in the clear, with 30 feet of water over the miter sills at extreme low stages in the lakes. The width of the canal at the bottom will be 200 feet, and it is understood that the least depth in the excavated channel will be 25 feet; but lock sills are being constructed with a 30-foot depth, so that a possible future deepening of the canal to 30 feet will not involve lock reconstruction. Depths in the sections adjoining Lake Erie and Lake Ontario are referred to extreme low lake levels, which are respectively 2.8 feet and 2 feet below the datum planes adopted for Federal harbor improvement.

THE ST. LAWRENCE RIVER

From the head of the St. Lawrence River to Montreal is a total distance of 182 statute miles, and from the latter point to the Strait of Belle Isle at the mouth of the St. Lawrence a distance of 1,003 miles, making the total length of the St. Lawrence River 1,185 miles. Between Lake Ontario and Galop Island, a distance of 68 miles, there is a channel 30 feet or more in depth, with a minimum width of 500 feet. At Galop Island the uppermost rapids are encountered, which have been overcome by the Galop Canal, constructed by the Dominion of Canada. This canal is 7⅓ miles long, with a bottom width of 80 feet, a surface width of 144 feet, and a depth of 14 feet on the sills. It has two lift locks, one of which is 800 feet long by 50 feet wide and the other 303 feet long by 45 feet wide. A guard lock at the head of the canal is 270 feet long by 45 feet wide and the total lockage is 15½ feet. Below this canal is a stretch of 4½ miles of navigable river extending to the head of the Rapide Plat Canal. This canal is 3⅜ miles long, 80 feet wide at bottom, and 152 feet wide at the surface, with 14 feet of water on the sills. It has two locks, each 270 feet long by 45 feet wide. It was constructed to enable vessels ascending the river to pass the rapids; descending vessels run the rapids safely. From the foot of the Rapide Plat Canal at the head of Farrans Point Canal there is a navigable stretch of 9½ miles. The Farrans Point Canal is 1¼ miles long, 90 feet wide at bottom, and 154 feet wide at the surface, with 14 feet of water on the miter sills of the new lock, which has a length of 800 feet and a width of 50 feet. The total lockage is 3½ feet, and descending vessels run the rapids with ease and safety. The new lock enables vessels ascending the river to avoid Farrans Point Rapids, passing a full tow at one lockage. The Farrans Point, Rapide Plat, and Galop Canals are collectively known as the Williamsburg Canals.

From the foot of Farrans Point Canal to the head of the Cornwall Canal there is a distance of 5 miles of navigable river. The Cornwall Canal is 11¼ miles long, 90 feet wide at bottom, and 154 feet wide at the water surface. It has one guard gate and six locks 270 feet long by 45 feet wide, with a total lockage of 48 feet. The Cornwall Canal extends past the Long Sault Rapids, from the town of Cornwall to Dickinsons Landing. Below the Cornwall Canal there is a stretch of 31 miles of navigable water through Lake St. Francis to the head of the Soulanges Canal. The Soulanges Canal is 14 miles long, 100 feet wide at bottom, and 164 feet wide at the surface, with 15 feet of water on the sills. It has one guard lock and four lift locks each 280 feet long by 45 feet wide, overcoming a total rise or lockage of 84 feet. This canal extends from Cascades Point to Coteau Landing, overcoming the Cascades Rapids, Cedar Rapids, and Coteau Rapids.

From the foot of the Soulanges Canal there is a navigable stretch of 16 miles in Lake St. Louis and the St. Lawrence River to the head of the Lachine Canal. The latter canal is 8½ miles long, with an average width of 150 feet. There are five locks each 270 feet long by 45 feet wide, at two of which the depth on the sills is 18 feet, and on the other three there is a depth of 14 feet. The total rise or lockage is 45 feet. The canal consists of one channel with two distinct systems of locks, the old and the enlarged, and there are two lock entrances at each end. The canal overcomes the St. Louis Rapids and extends from the town of Lachine to the city of Montreal.

From Montreal to Father Point a 30-foot channel has been practically completed, with a width of 450 feet in the straight portions and of 600 to 750 feet in the bends between Montreal and Quebec, and of 1,000 feet everywhere below Quebec. The deepening of this channel to 35 feet was begun in 1909. By means of these channel improvements Montreal has been placed at the head of ocean navigation on the St. Lawrence River.

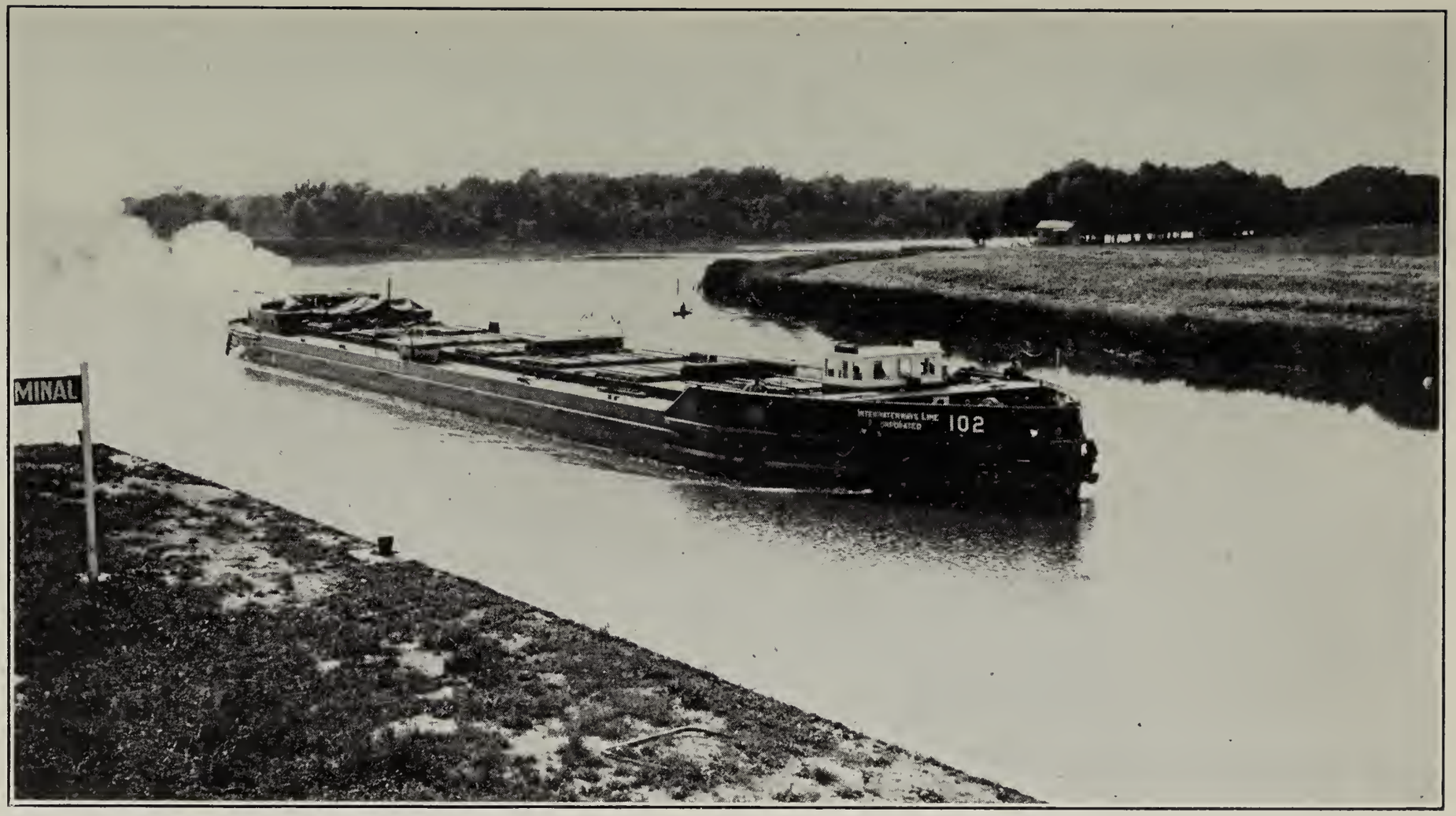
THE NEW YORK STATE BARGE CANAL

The New York State Barge Canal constitutes a free waterway affording through connection between Lakes Erie and Ontario on the west and the Hudson River on the east. The Erie Canal extends from Troy Lock in the Hudson River to Tonawanda on the Niagara River, a distance of 340.7 miles. The canal has 35 locks with a length of chamber from the lower gate to the breast wall of 310 feet, a width of 44½ feet, and a depth of 12 feet over miter sills. Owing to local conditions at Locks 17 and 35, the lengths of vessels must not exceed 300 feet. The project depth of channel is 12 feet. The minimum bottom width in the land line is 75 feet in earth with 123 feet at water level; 94 feet in rock; and in the river and lake sections from 150 to 200 feet. The clearance at bridges is 15½ feet above the maximum navigable elevation of water surface. For the most part the bridges are fixed structures, except where local conditions render other types preferable.

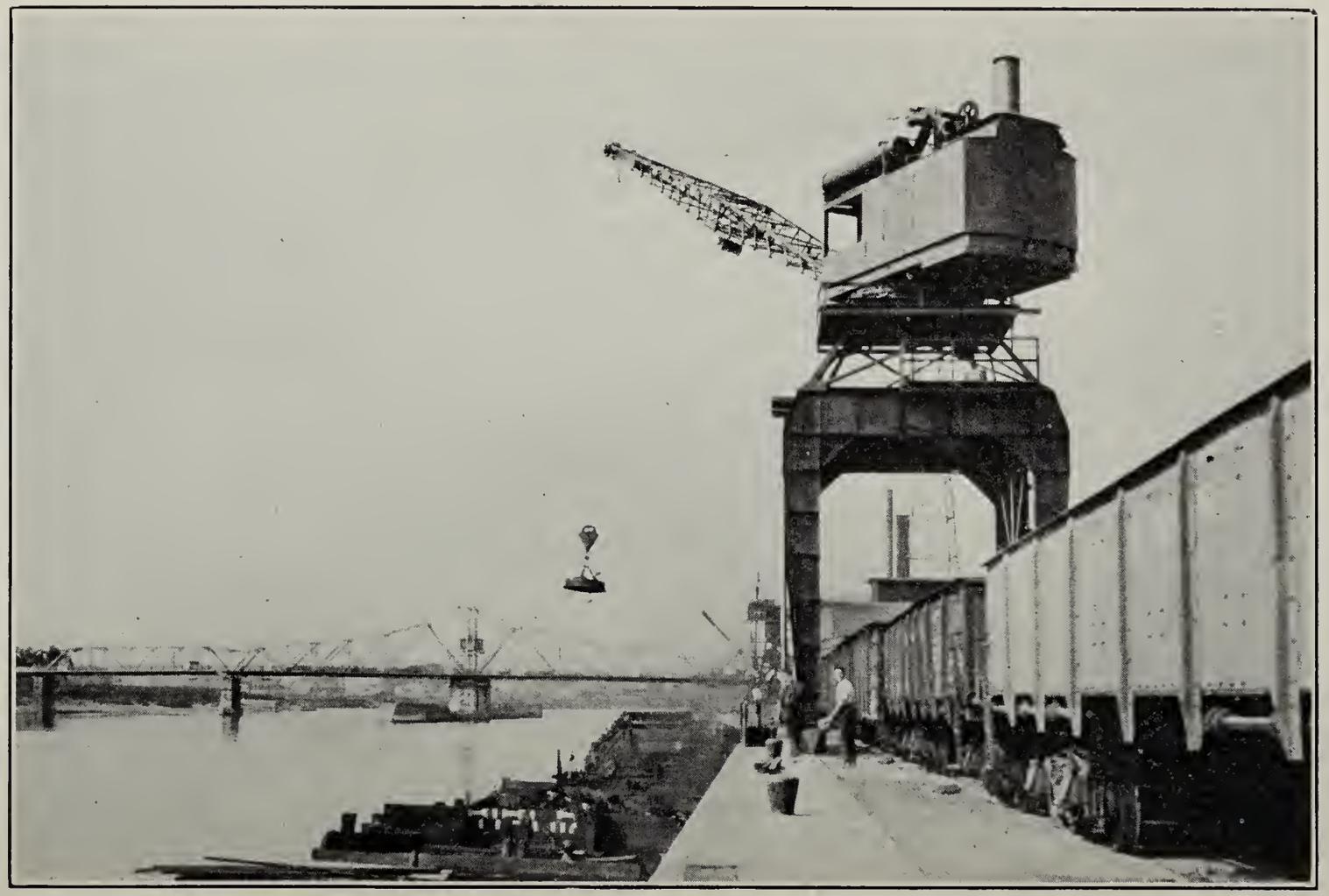
The Oswego Canal extends from Three Rivers Point at the head of Oswego River (164 miles from Troy Lock) to Oswego on Lake Ontario. It has seven locks and a length of 23.8 miles. The dimensions of the canal and its locks are the same as those on the main Erie Canal.

The total distance from Buffalo to New York by way of the Erie Canal is 506.72 miles, and the total distance from Oswego to New York by way of the Oswego Canal is 338.40 miles.

The Cayuga and Seneca Canal is a feeder to the barge canal, and extends from the Erie line at confluence of Seneca and Clyde Rivers, to Ithaca on Cayuga Lake, and Montour Falls on Seneca Lake.



MOTOR SHIP AT WEEDSPORT ON THE NEW YORK STATE BARGE CANAL



CRANE AT TROY TERMINAL

It is 92.8 miles long and has four locks. The dimensions of the canal and its locks are the same as for the Erie Canal.

Lake Champlain may be reached from the Hudson River by the Champlain Canal, which extends from Waterford on the Hudson River to Whitehall on Lake Champlain, a distance of 62.6 miles There are eleven locks in this canal. By means of the Richelieu River and Chambly Canal vessels drawing 6½ feet or less may reach the St. Lawrence River at Sorel, 46 miles below Montreal.

THE THROUGH CHANNEL

Throughout a distance of some 1,218 miles from Duluth-Superior to Ogdensburg, N. Y., improvement of natural conditions has been required over a total length of about 60 miles, comprising reaches of the St. Marys River, St. Clair River, Lake St. Clair, and the lower Detroit River, and of 27 miles comprising the Welland Canal. Within these several stretches depths and widths have been provided, practically exclusively by United States and Canadian Governments expenditure (the single exception being early State operations at St. Marys Falls) in step with commercial needs and with the result that commodious connecting channels and locks are available for the prompt and convenient service of the largest lake freighters constructed or contemplated. Such artificial channels have been excavated to low water depths of 21 feet over rock bottom and 20 feet over earth bottom, with widths to accord with the locality and character of the particular case. Generally, a minimum width of 600 feet is found in channels accommodating 2-way traffic, and of 300 feet in those assigned to 1-way traffic. The project depths are referred to low water datum, and it should be observed that during the navigation season higher water levels usually make available from one to two feet of additional depth. At the St. Marys Falls Canal the most modern third and fourth locks will each pass simultaneously two of the largest lake freighters, being provided with chambers of 80 feet width and 1,350 feet length between gates, and having 24.5 feet of water over miter sills.

Due both to a natural low-water cycle and to diversions of water for domestic and sanitary purposes, the levels of the lakes are, at times, depressed to an extent seriously affecting the cargo capacity and the earning ability of the lake carriers. The operating loss for the fleet one season, due to a decrease of 1 foot in depth, is approximately $7,000,000 and the reduction in transportation capacity amounts to between 7,000,000 and 9,000,000 tons annually. For purely lake traffic, existing channels with enlargements in progress are theoretically adequate for the accommodation of a much larger traffic than now exists. The critical point of capacity is the St. Marys Falls Canal, through which, under present conditions, about

60 per cent of the freight tonnage passes. However, it is probable that existing facilities may be counted upon to dispatch with all reasonable convenience something like 150,000,000 tons annually.

Summarizing, it may be stated that with normal rainfall to maintain lake levels the capacity of through channels and lockage facilities at St. Marys Falls is adequate for any purely lake business likely to arise for a generation or more. The single future development bringing inadequacy into question is an ocean-lakes connection via the St. Lawrence River, or across the State of New York, in the event of which an inventory and readjustment of connecting channels and lock facilities would be required to accord with the ocean-lake carriers to be served.

HARBORS

An obvious prerequisite for the commercial use of the Great Lakes waterway system is commensurate harbor development so that vessels may have safe access and receive and discharge cargoes. In general, the harbors are in or include the mouths of rivers where the Federal Government has created outer harbors in the lakes, and has deepened the mouths, protecting them with piers or jetties. Consistent with Federal adopted policy, improvement of the river channels upstream from the Federal works has, at most localities, been left to local interests. The harbors, while primarily for commercial use, with terminal facilities for transfer of cargoes, are incidentally harbors of refuge, smaller vessels taking refuge in all of them, while the larger vessels frequently lie outside the harbor entrances awaiting weather conditions favorable to safe entrance. The only harbors created distinctively as harbors of refuge are at Harbor Beach, Mich., and Cape Vincent, N. Y.; although several, originally improved to serve as commercial harbors, are now maintained primarily as harbors of refuge, viz, on Lake Superior, at each entrance to Keweenaw waterway; at Marquette Bay and Grand Marais, Mich.; on Lake Erie, at Dunkirk, N. Y.

In all there are approximately 400 harbors on the Great Lakes and connecting channels. Of these about 80 are of sufficient importance to warrant improvement by the Federal Government. The commerce of the small and unimportant harbors consists mainly of receipts of coal, supplies for local consumption, and shipments of lumber, pulpwood, etc. The more important ports on the Great Lakes have facilities and railroad connections for handling through traffic in addition to local commerce. The following table shows the channel depths of the more important harbors improved by the United States:

TABLE NO. 2.—*Depths of principal United States harbors of the Great Lakes*

Harbor	Project depths at low-water datum
LAKE SUPERIOR	
Duluth-Superior, Minn	30 feet in entrance channel. 24 feet between piers. 22 feet in anchorge area. 20 feet in inner channels.
Grand Marais, Minn	16 feet.
Agate Bay, Minn	22 feet or more (natural depth).
Ashland, Wis	20 feet.
Ontonagon, Mich	17 feet in entrance. 15 feet in inner harbor.
Ports on Keweenaw waterway	20 feet.
Marquette, Mich	22 feet.
Grand Marais, Mich	18 feet in harbor. 20 feet at entrance.
LAKE MICHIGAN	
Manistique, Mich	18 feet.
Menominee, Mich. and Wis.	18 feet.
Green Bay Harbor	21 feet in entrance channel. 18 feet in inner harbor.
Sturgeon Bay Canal, Wis	19 feet.
Kewaunee, Wis	18 feet.
Two Rivers, Wis	14 feet.
Manitowoc, Wis	18 feet.
Port Washington, Wis	16 feet.
Sheboygan, Wis	20 to 22 feet at entrance. 20 feet in turning basin.
Milwaukee, Wis	21 feet.
Racine, Wis	19 feet.
Kenosha, Wis	19 feet in entrance channel. 18 feet in interior basin.
St. Joseph, Mich	18 feet. 15 feet in canal to Benton Harbor.
South Haven, Mich	19 feet in entrance channel. 17 feet in Black River.
Saugatuck, Mich	16 feet in entrance channel. 14 feet in Kalamazoo River.
Holland, Mich	16 feet.
Grand Haven, Mich	18 feet.
Muskegon, Mich	24 feet at entrance. 21 feet in inner channel.
Ludington, Mich	18 feet.
Manistee, Mich	20 feet in entrance. 18 feet in inner harbor.
Frankfort, Mich	20 feet at entrance. 18 feet in inner channel.
Charlevoix, Mich	15 feet.
Waukegan, Ill	18 feet.
Chicago, Ill	21 feet.
Calumet (South Chicago), Ill	21 feet in entrance. 20 feet in Calumet River.
Indiana Harbor, Ind	22 feet in entrance. 20 feet in inner harbor.
Michigan City, Ind	18 feet.
LAKE HURON	
Mackinac, Mich	18 feet (natural depth).
Cheboygan, Mich	18½ feet. 3½ feet in river.
Alpena, Mich	16½ feet.
Harbor Beach, Mich	23 feet in entrance channel. 21 feet in anchorage area.
LAKE ERIE	
Toledo, Ohio	21 feet in entrance channel. 19 feet in Maumee River.
Sandusky, Ohio	21 feet in outer channel. 22 feet in inner channels and turning basin.
Huron, Ohio	19 feet.
Vermilion, Ohio	12 feet.
Lorain, Ohio	20 feet.
Cleveland, Ohio	19 to 23 feet.
Fairport, Ohio	19 feet.
Ashtabula, Ohio	20 feet.
Conneaut, Ohio	20 feet.
Erie, Pa	20 feet.
Buffalo, N. Y	21 feet in entrance channels. 21 to 23 feet in inner harbor.
LAKE ONTARIO	
Rochester (Charlotte), N. Y	20 feet.
Great Sodus Bay, N. Y	18 feet.
Little Sodus Bay, N. Y	15½ feet.
Oswego, N. Y	23 feet in entrance channel. 21 feet in outer harbor. 15½ feet in inner harbor.
ST. LAWRENCE RIVER	
Ogdensburg, N. Y	19 feet.

State Geological Survey

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SUBMITTED:

W. E. Grav
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Drawn by J.E.P.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

PROJECT DEPTHS OF CHANNELS AND HARBORS OF THE GREAT LAKES AND CONNECTING WATERWAYS

DEPTHS REFERRED TO LOW WATER

SUBMITTED:
W. E. Graves
CHIEF STATISTICIAN
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Data by J.T.H.

WILLIAMS & HEINTZ CO. WASH. D.C.

II. LAWS, TREATIES, AND REGULATIONS

NAVIGATION AND USE OF WATERS

Under treaty provisions vessels of the United States and of Great Britain and Canada enjoy equal, free, and open use of all navigable boundary waters for purposes of navigation.

The St. Lawrence River in Canada, with its canals, constitutes a navigable outlet from the boundary waters and, under the adopted treaties, citizens of the United States are entitled to use it freely and openly for the purposes of commerce below the point where it ceases to form the boundary between the two countries. Similar privileges are extended to the subjects of Great Britain regarding navigation on Lake Michigan, although it is considered a closed sea and not a boundary water.

Many special rules and regulations concerning navigation on the Great Lakes are in effect and apply particularly to canals, locks, bridges, harbors, and restricted channels. Operations for the improvement of channels and harbors, and fishing, are subject to the laws and regulations of the nation controlling the locality.

Legislative acts respecting the control of merchant vessels on the high seas apply very uniformly to vessels on the Great Lakes. One important exception, however, is a recent act of Congress (Public Document No. 934, 70th Cong.) known as the "load law." Under this law, load lines are established for the following vessels: (*a*) Merchant vessels of 250 gross tons or over, loading at or proceeding to sea from any port or place within the United States or its possessions for a foreign voyage by sea, the Great Lakes excepted; (*b*) Merchant vessels of the United States of 250 gross tons or over, loading at or proceeding to sea from any foreign port or place for a voyage by sea, the Great Lakes excepted.

INTERNATIONAL JOINT COMMISSION

The boundary treaty of 1909 created an International Joint Commission composed of three commissioners from the United States and three from Great Britain and Canada, to whom certain questions concerning the use, obstruction, and diversion of boundary waters are now referred. This commission has laid down the following general principles:

1. In all navigable waters the use for navigation purposes is of primary and paramount right. The Great Lakes system on the

boundary between the United States and Canada and finding its outlet by the St. Lawrence to the sea should be maintained in its entirety.

2. Permanent or complete diversions of navigable waters or their tributary streams should only be permitted for domestic purposes and for the use of locks in navigation canals.

3. Diversions can be permitted of a temporary character where the water is taken and returned, when such diversions do not interfere in any way with the interests of navigation. In such cases each country is to have a right to diversion in equal quantities.

DIVERSION OF WATER

The Great Lakes form a natural system of storage reservoirs, the level of each being largely dependent upon the conditions in the lakes above, and to a less extent in those below it. Any permanent diversion of water from the basin of the Great Lakes, such as that through the Chicago Drainage Canal, has an effect on navigation, since at times it causes a lowering of lake levels and a decrease of depths in the connecting waterways. In some years, however, lake levels rise regardless of the diversion through the drainage canal. The Federal Government is limiting and restricting this diversion.

REGULATIONS AFFECTING NAVIGATION

Regulations affecting navigation on the Great Lakes and connecting waters are published in full in annual bulletins issued by the United States Lake Survey, Old Customhouse, Detroit, Mich. The latest bulletin is No. 38, Survey of Northern and Northwestern Lakes, June, 1929, and supplements thereto.

Bulletin No. 38 contains regulations for navigation of the Lakes at large and for the various harbors connected therewith. The regulations cover such subjects as signals for drawbridges and answering signals from the bridge; display of lights on tows, bridges, wrecks; speed of vessels at critical points; lengths of towing hawsers; routes for upbound and downbound commerce; anchorage areas; damage to public works; rules for the operation of locks, etc.

There is given below a list of the special regulations published, together with the page number, of Bulletin No. 38.

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Rules and regulations governing display of signals 26–30
Rules and regulations for Keweenaw waterway 59–60
Rules and regulations for harbor of Duluth, Minn., and Superior, Wis.. 76
Rules and regulations relating to anchorage and navigation in St. Marys River 103–106
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Regulations to govern the use, administration, and navigation of St. Marys Falls Canal and Locks, Mich---- 111
Regulations to govern the speed of vessels entering or leaving various harbors on Lake Michigan---- 119
Regulations for navigation of Sturgeon Bay and Lake Michigan Ship Canal---- 147
Anchorage grounds in the harbor at Chicago, Ill., and rules and regutions relating thereto---- 179
Regulation governing speed of vessels, St. Clair River in front of Sarnia-- 290
Rules and regulations for the government of St. Clair Flats Ship Canal-- 298
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Rules and regulations governing the navigation and use of entrance channels and sheltered areas of the harbors of Conneaut, Ashtabula, Fairport, Cleveland, Lorain, and Huron, in the State of Ohio---- 315
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Rules and regulations for the government of channels in and about Sandusky Bay---- 351
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Rules and regulations for navigation of Black Rock Canal and Lock and Ferry Street Bridge at Buffalo---- 379
Rules and regulations governing the navigation and use of Charlotte Harbor---- 407
Regulations to govern the use and administration of the harbor and United States breakwater at Cape Vincent, N. Y---- 424

CUSTOMS AND IMMIGRATION

The same customs and immigration requirements apply to vessels on the Great Lakes and the St. Lawrence River as to those on the high seas.

A digest of the more important regulations of the Public Health Service (quarantine and hospital service), the Customs Service, and the Immigration Service and information relative to their services and charges applicable to vessels, freight, and passengers are contained in Miscellaneous Series No. 1, entitled "Port and Terminal Charges at United States Ports." A list of the Federal documents which vessels are required to have is also contained in that volume. Miscellaneous Series No. 2 contains information relative to services and charges of United States consular officers abroad and of foreign consular officers stationed at the various seaports of the United States. In addition, special customs regulations have been adopted which must be complied with by all vessels navigating these northern waters.

CUSTOMS REGULATIONS APPLYING PARTICULARLY TO THE NORTHERN BORDER

ART. 46. *Vessels on Great Lakes.*—Vessels of the United States navigating the waters on the northern, northwestern and northeastern frontiers otherwise than by sea must receive special enrollment and be licensed before they can be employed on those waters. The enrollment and license shall be in the special form provided for vessels in the domestic and foreign trade otherwise than by sea, viz,

Commerce Form 1273. Commerce Form 1290 is used for yachts. Registers of American vessels arriving from a foreign port must be deposited in the customhouse under the provisions of article 93, and any marine document of a vessel in port may be left in the customhouse for surrender and exchange.

ART. 47. *Repairs.*—Before any such enrollment or license, or renewal of either, on the frontiers aforesaid can be granted the owner or master must make oath that all repairs put upon the vessel in a foreign country within the year immediately preceding the application have been accounted for, and the duties, if any, paid and refusal or false swearing is punishable by forfeiture of the vessel.

Certificates of registry are not ordinarily required by law for vessels employed on the Great Lakes or their tributary waters. Such vessels are, however, in every other respect, liable to the rules, regulations, and penalties in force relating to registered and to enrolled and licensed vessels.

ART. 48. *Transfer from Lakes to seaboard.*—When a vessel so enrolled and licensed leaves the inland waters of the frontiers and engages in trade on the seaboard, she must surrender her frontier papers and take out coasting papers; and if bound on a foreign voyage partly by sea, she must take, in lieu of her frontier papers, a certificate of registry.

If she sails for a frontier port, and it is intended to clear her thence for a port in the United States on the seaboard or for a foreign port, in part by sea, she should be furnished with a certificate of registry before starting on her voyage. Vessels neglecting these precautions will be subjected to the penalties and disabilities imposed on vessels engaged in trade without legal documents.

ART. 174. *Report—manifest—entry of merchandise.*—Vessels arriving in districts on the northern and northwestern frontiers shall be reported to the collector or other customs officer at a port of entry, and the merchandise so imported shall be accompanied with manifests, and entries thereof must be made by the owners or consignees.

The powers and duties of the officers of customs shall be exercised in like manner as is prescribed with respect to merchandise imported in vessels from the sea, and generally all such importations shall be subject to like regulations, penalties, and forfeitures.

ART. 175. *Delivery of manifests.*—The master of any vessel, except registered vessels, and every person having charge of any boat, canoe, or raft coming from any foreign contiguous territory into the United States with merchandise subject to duty is required to deliver, immediately on his arrival within the United States a manifest of the cargo of such vessel, boat, canoe, or raft at the office of the collector or other customs officer nearest to the boundary line, or nearest to the waters by which such merchandise is brought, and every such manifest shall be verified by the oath of such person delivering the same, which oath shall be taken before such collector or deputy collector, and such oath shall state that such manifest contains a full, just and true account of the kinds, quantities, and values of all the merchandise so brought from such foreign territory.

ART. 176. *Failure to deliver—penalty.*—If the master or other person having charge of a vessel, boat, canoe, or raft bringing merchandise subject to duty from a contiguous foreign territory, neglects or refuses to deliver the manifest thereof as prescribed in the preceding article, such merchandise so imported will be liable to forfeiture, together with the vessel, boat, canoe, or raft, and the master or other importer will be subject to a penalty of four times the value of the merchandise so imported.

ART. 177. *Touching at intermediate ports.*—The master of every vessel enrolled and licensed to engage in the domestic and foreign trade on the northern, northeastern, and northwestern frontiers shall before the departure of his vessel from a port in one collection district to a port in another collection district,

present to the collector at the port of departure duplicate manifests of his cargo (Customs Form 7529 or 7531) or, if he have no cargo, duplicate manifests setting forth that fact, which manifests shall be sworn to by the master before the collector, who shall indorse thereon his certificate of clearance, retaining one for the files of his office and delivering the other to the master.

If such vessel shall touch at an intermediate port in the United States and there discharge cargo taken on board at an American port or at such intermediate port shall take on board cargo destined for an American port, the master of such vessel will not be required to report the lading or unlading at such intermediate port, but shall enter the same on his manifest obtained at the original port of departure, which he shall deliver within 24 hours after arrival to the collector of the port at which the unlading of the cargo is completed, and will make oath to the same.

ART. 178. *Clearance.*—The master will, before departing from a port in one collection district to a place in another collection district where there is no customhouse, file his manifest and obtain a clearance, which manifest and clearance shall be delivered to the officer of customs of the port at which the vessel next arrives after leaving the place of destination named in said clearance.

ART. 179. *Trading between ports and places not ports.*—The master of such vessel destined, with cargo, from a place in the United States, at which there is no customhouse to a port where there is a customhouse shall, within 24 hours after arrival at the port of destination, deliver to the officer of the customs a sworn manifest setting forth the cargo laden at the place of departure, or laden or unladen at any intermediate port or place; but if the vessel have no cargo the master is not required to deliver such manifest.

The master of a vessel departing from any port in a collection district to another port in the same district, or to a place in the same district where there is no customhouse, is not required before departing to obtain a clearance.

ART. 180. *Steam tugs—ferryboats—penalties.*—Steam tugs, duly enrolled and licensed, when exclusively employed in towing vessels which have to enter or clear, are not required to report and clear at the customhouse, but when such tugs are employed in towing rafts, or other vessels without sail or steam motive power, not required to be enrolled or licensed under existing laws, they must report and clear in the same manner as other vessels.

A vessel used exclusively as a ferryboat between the United States and foreign contiguous territory, however laden, is not required to enter and clear, and the master is not required to present a manifest, but must report on arrival to the officer of customs all baggage and merchandise which may be brought from a foreign territory. Canadian vessels making two trips daily or semiweekly trips to the United States ports are not entitled to the exemptions of ferryboats.

The master of every vessel failing to comply with any of these provisions is liable to a penalty of $20.

ART. 181. *Permit to unlade.*—The master of a vessel with cargo, passengers, or baggage, from any foreign port or place, must obtain a permit from the collector and comply with these regulations before discharging or landing any portion thereof; and merchandise destined for any foreign port must be reported as the law directs, but no permit will be required for the unlading of cargo brought from an American port.

ART. 182. *Unlading in another district.*—Merchandise taken from any port of place in the United States, on the frontiers, to a port or place in another collection district thereof, in any vessel, can not be unladen from such vessel except in open day, unless by special license from the collector, nor at any time without a permit from such collector. The owner of every vessel whose master shall neglect

to comply with these provisions will be subject to a penalty of not less than $100 nor more than $500.

ART. 183. *Trade on Lake Michigan.*—Vessels engaged in the domestic trade between ports and places on Lake Michigan exclusively laden with American products and free merchandise only, may unlade without obtaining a permit.

ART. 184. *Foreign vessels not to engage in coasting trade on frontiers.*—If any merchandise shall be laden at any port or place in the United States on such frontiers upon any vessel belonging wholly or in part to a subject of a foreign country, and shall be taken thence to a foreign port or place to be reladen and reshipped to any other port or place in the United States on such frontiers, either by the same or any other vessel, foreign or American, with intent to engage in the domestic trade of the United States, such merchandise will be subject to forfeiture and the vessel to a tonnage duty of 50 cents per ton.

ART. 185. *Sea and saloon stores of American vessels trading with Canada.*—The master of every vessel of the United States on the waters of the frontiers touching at a foreign port or place who shall purchase there any goods for the use of such vessel shall report the same as "sea stores," with cost and quantity thereof, to the collector at the first port of the United States in which the vessel shall next arrive, and shall make oath that they are intended for the exclusive use of the vessel, and not for sale, transfer, or private use. If the quantities be excessive duty must be paid on the excess, under penalty of fine or imprisonment.

If any such articles are found on board not covered by the report, or if any part thereof be landed without a permit, they, with the vessel, her tackle, apparel, and furniture, will be forfeited. Articles intended for sale on board, as saloon stores or supplies, are dutiable and must be entered as merchandise, under penalty of fine and imprisonment.

ART. 186. *Equipment and repairs to American vessels on waters of northern frontiers.*—Equipment and repairs obtained in foreign countries by vessels of the United States navigating the waters of the northern, northeastern, and northwestern frontiers otherwise than by sea are dutiable, and entry must be made of them on the first arrival in any port of the United States.

Upon sufficient evidence, however, that the vessel put into a foreign port on account of stress of weather in the regular course of its voyage and that the repairs then put on her were necessary to secure the safety of the vessel to enable it to reach its destination, the Secretary of the Treasury may remit or refund the duties thereon.

ART. 104. *Bills of health—port sanitary statements.*—* * * Consular bills of health are not required for vessels plying between foreign ports on or near the frontier and domestic ports adjacent thereto, except during the prevalence of any of the quarantinable diseases at such foreign ports. * * *

VESSELS TRADING WITH CONTIGUOUS COUNTRIES

ART. 189. *Vessels of less than 5 net tons—report—manifest—penalty.*—The master of any vessel of less than 5 net tons carrying merchandise arriving from a contiguous foreign country shall immediately report his arrival to the collector or other customs officer at the nearest port of entry or customhouse, and produce a manifest of such merchandise. No such vessel shall proceed farther inland or discharge any merchandise, passengers, or baggage without receiving a permit from such customs officer.

If the master fails to report arrival in the United States, he will be subject to a fine of $100 for each offense; and if any merchandise or baggage is unloaded or discharged from such vessel without a permit therefor, the same together with the vessel will be subject to forfeiture.

Failure to report arrival of any vessel from a contiguous foreign country, or the neglect or failure to file a manifest for the merchandise on board, will subject the vessel and merchandise to forfeiture, and the master to a penalty equal to the value of the merchandise imported in such vessel. The master will also be liable to a penalty equal to the value of all merchandise imported in such vessel and not included in the manifest.

The manifest of every vessel importing merchandise from a contiguous foreign country must be verified by the person delivering the same under oath taken before the collector or other customs officer authorized to administer oaths.

Entries must be made by the owners or consignees of such merchandise and the powers and duties of the customs officers shall be exercised in like manner as is prescribed in respect to merchandise imported in vessels from the sea, and generally all such importations will be subject to like regulations, penalties, and forfeitures.

ART. 190. *Touching at intermediate ports.*—The master of every vessel trading with contiguous foreign countries on the northern, northeastern, and northwestern frontiers will, before the departure of his vessel from a port in one collection district to a port in another collection district, present to the collector at the port of departure a duplicate manifest of his cargo on Commerce Form 1374, or if he have no cargo, a duplicate manifest setting forth that fact, which manifest shall be sworn to by the master before the collector who will indorse thereon his certificate of clearance, retaining one for the files of his office and delivering the other to the master.

If the vessel touches at an intermediate port in the United States and there discharges cargo taken on board at an American port, or at such intermediate port shall take on cargo destined to another American port, the master will not be required to report the lading or unlading at such intermediate port, but will enter the same on the manifest obtained at the original port of departure which he shall deliver within 24 hours after arrival to the collector of the port at which the unlading is completed, and will make oath to the same.

To avoid unnecessary inspection of the merchandise not to be unladen at the first port of arrival, the master may apply to the customs or consular officer of the United States stationed in the place from which such merchandise is shipped, and such officer may seal the hatches of the vessel. Any vessel so sealed may then proceed with such merchandise to the port of destination.

ART. 191. *Failure to proceed to port of destination—unlawful unloading—penalty.*—If the master of any vessel so sealed fails to proceed with reasonable promptness to the port of destination, and deliver such vessel to the proper officers of the customs, or unlades merchandise at other than the port of destination, or disposes of any merchandise under seal, by sale or otherwise, he will upon conviction be liable to a fine of not more than $1,000, or to imprisonment for not more than five years, or both; and such vessel with its contents will be subject to forfeiture.

ART. 192. *Clearance.*—The master will, before departing from a port in one collection district to a place in another collection district where there is no customhouse, file his manifest and obtain a clearance, which manifest and clearance shall be delivered to the officer of customs of the port at which the vessel next arrives after leaving the place of destination named in said clearance.

ART. 193. *Trading between ports and places not ports.*—The master of such vessel destined, with cargo, from a place in the United States at which there is no customhouse to a port where there is a customhouse shall, within 24 hours after arrival at the port of destination, deliver to the officer of the customs a sworn manifest setting forth the cargo laden at the place of departure, or laden

or unladen at any intermediate port, or place; but if the vessel have no cargo the master is not required to deliver such manifest.

The master of a vessel departing from any port in a collection district to another port in the same district, or to a place in the same district where there is no customhouse is not required before departing to obtain a clearance.

ART. 194. *Steam tugs—ferryboats—penalty.*—Steam tugs, duly enrolled and licensed, when towing vessels which have to enter or clear, are not required to report and clear at the customhouse.

Passenger vessels making three trips or oftener a week between ports in the United States and contiguous foreign territory, or vessels used exclusively as ferryboats, carrying passengers, baggage, or merchandise are not required to enter and clear, but the master shall be required to report such baggage and merchandise to the collector within 24 hours after arrival.

The master of every vessel failing to comply with any of these provisions is liable to a penalty of $20 for each and every failure, and for which sum the vessel will be liable.

ART. 195. *Permit to unload.*—The master of a vessel with cargo, passengers, or baggage from any foreign port or place must obtain a permit from the collector and comply with these regulations before discharging or landing any portion thereof; and merchandise destined for any foreign port must be reported as the law directs; but no permit will be required for the unlading of cargo brought from an American port.

ART. 196. *Foreign vessels not to engage in coastwise trade on frontier.*—No merchandise shall be transported by water, or by land and water, on penalty of forfeiture thereof, between points in the United States, including Districts, Territories, and possessions thereof embraced within the coastwise laws, either directly or via a foreign port, or for any part of the transportation in any other vessel than a vessel built in and documented under the laws of the United States and owned by persons who are citizens of the United States, or vessels to which the privilege of engaging in the coastwise trade is extended by sections 18 or 22 of the merchant marine act.

This shall not apply to merchandise transported between points within the continental United States, excluding Alaska, over through routes heretofore or hereafter recognized by the Interstate Commerce Commission for which routes rate tariffs have been or shall hereafter be filed with said commission when such routes are in part over Canadian rail lines and their own or other connecting water facilities.

ART. 197. *Sea and saloon stores and supplies of American vessels—repairs and equipment—penalty.*—The master of every vessel of the United States documented to engage in foreign and coasting trade on the northern, northeastern, and northwestern frontiers shall, upon arrival from foreign contiguous territory, file with his manifest a detailed list of all supplies or other merchandise purchased in such foreign country for use or sale on such vessel, as well as a statement of the cost of all repairs to and all equipment taken on board such vessel.

If any such supplies, merchandise, repairs, or equipment shall not be so reported,the master will be liable to a fine of not less than $100 and not more than $500, or to imprisonment for not more than two years, or both.

The master will make affidavit on Customs Form 3415 as to such equipmenf or repairs as may have been purchased or made, or on Customs Form 3417, if none.

The master will also make oath before the collector that such supplies listed as "sea stores" are intended for the exclusive use of the vessel. If the quantities thereof be excessive, duties must be paid on the excess.

Supplies listed as "saloon stores," intended for sale on board the vessel, are dutiable and must be entered as merchandise.

ART. 219. *Transshipment.*—Any transshipment of merchandise in foreign territory from cars to vessels or from vessels to cars must be made under the supervision of a customs officer. In such cases an extra copy of the manifest will be made out for each place of transshipment and mailed to the customs officer stationed at such place, who will supervise the transshipment, note the same on the conductor's or master's copy of the manifest, return said copy and forward the extra copy by mail to the port of destination in the United States.

Livestock in transit through Canada may be fed and watered at places where there are no United States officers under the supervision of a Canadian customs officer, who may reseal the cars with Canadian seals and make a notation thereof on the manifest.

MERCHANDISE IN TRANSIT BETWEEN PORTS OF CANADA AND MEXICO THROUGH THE UNITED STATES

ART. 220. *Manifests.*—Whenever merchandise under Canadian or Mexican customs seals arrives at a frontier port for transportation through the United States, a manifest in triplicate, showing the quantity and character of the merchandise, signed by the agent of the carrier, must be filed with the collector, who will thereupon issue "In bond" seals to be affixed to such cars or packages, and allow the merchandise to proceed by a bonded route.

Two copies of the manifest will be certified by the customs inspector, and one copy forwarded by mail to the port of exit and the other delivered to the conductor of the train for delivery to the customs officers at the port of exit, who will, upon the merchandise leaving the United States, certify such fact on one copy of the manifest, and forward the same to the comptroller of customs in whose district the port of arrival is located.

In case merchandise covered by any manifest is not exported within 60 days from the date of the receipt of the mail copy of the manifest, the collector at the port of exit will return such manifest to the collector at the port of arrival, who will call upon the carrier to trace the shipment, and if it appears that the same, or any part thereof, has not been exported, will call upon the carrier for the penalty accruing under its bond, and report the facts to the department.

If the seals should be found at the port of exit to be broken or to have been tampered with the contents of the car must be checked with the manifest, and if any shortage or substitution should be found the collector will detain the car and report the facts to the department for instructions.

In addition to the manifest above provided for, packages shipped under cord and seal in transit through the United States shall have attached to at least one package of each separate shipment a special card manifest in the following form on heavy manila paper or linen 3 by 6 inches in size, with a red strip one-half inch wide in the center thereof on both sides, and so perforated that the return coupon may be readily detached.

UNITED STATES CUSTOMS

Express or railroad company. In bond.
Special manifest No. ———.
Of merchandise in transit through the United States. From ———. To ———.
Via ———. Consigned to ———. Port of ———. ———, 19—.

I hereby certify that ——— packages were duly corded and sealed by me and delivered for transportation.

———— ————,
United States Inspector of Customs.

(Return coupon)

Port of ———— ————,
————, ————, 19—.

I hereby certify that ——— corded and sealed packages covered by special manifest No. —, ——— ——— Co. were exported to ——— through this port; this ——— day of ———, 19—.

———— ————,
United States Inspector of Customs.

The inspector at the port of arrival shall inspect such packages, note on the card manifest the number of packages in the shipment, and execute the first indorsement on such card manifest.

The inspector at the port of exit shall examine the packages, and if found correct and in good order execute the second indorsement and detach and return the coupon to the collector at the port of arrival. If any of the packages do not arrive, or bear evidence of shortage, the collector at the port of exit will report the facts to the collector at the port of arrival.

ART. 221. *Carriage by land and water.*—Such merchandise in transit through the United States may be transported by a route a part of which is by land carriage and a part by water under the same conditions as provided in articles 820 to 824, inclusive, for the transit of merchandise from port to port in the United States through Canada.

ART. 222. *Storage and transfer—manifest.*—When the merchandise is to be stored awaiting transshipment in foreign territory, the transshipping customs officer will take up the conductor's or master's copy of the manifest and check the cargo into a storehouse, where it will remain under customs locks or seals until transshipment is made.

Upon transshipment a new manifest must be prepared for each car or vessel, and the merchandise so transshipped on each car or vessel noted on the original manifest, which will be forwarded with the last shipment of the transshipped goods to the port of reentry. Upon arrival in the United States the customs officers will check off on the mail copy of the original manifest received by them the shipments as they arrive, and on arrival of the last shipment and the conductor's or master's copy of the original manifest will check the shipments arriving against the quantities transshipped to insure that no excess over the quantity originally shipped is admitted on in transit manifests.

III. VESSELS ON THE GREAT LAKES

DEVELOPMENT OF SHIPPING

The improvements made by the Federal Government in the connecting channels and at the harbors of the Great Lakes have resulted in gradual but marked changes in the types and capacities of the vessels operated.

Following the trend and expansion of industry and keeping step with the requirements of the times, the slow-moving sailing vessels of small capacity have been supplanted by the modern freight steamers, so that the present day fleet, together with facilities ashore, make the Great Lakes preeminent among the waterways of the world, especially in the transportation of commodities in bulk. In 1928 the lake commerce amounted to over 149,000,000 short tons, of which about 91 per cent consisted of commodities classified as bulk.

The records show that in 1868 the total number of documented American vessels, exclusive of canal boats, amounted to 2,543, with a gross tonnage of 454,051, averaging 178 tons per vessel. In 1929 the number dropped to 2,457, but the gross tonnage had risen to 2,763,920, averaging 1,124 tons per vessel. Classified by types of vessels, steamers averaged 230 gross tons in 1868, sailing vessels 158 gross tons, and barges 250 tons; while in 1929 steamers averaged 2,145 tons, the 51 remaining sailing vessels averaged 1,956 gross tons, and barges 361. Motor vessels were included with the steamers until 1915, when they were recorded separately.

The first American ship on the Lakes was built at Erie, Pa., in 1797. Shipbuilding progressed on Lakes Erie and Ontario during the following years and for some time shipping activities on these lakes exceeded that of the other lakes combined. The first steam-powered vessel was built on Lake Ontario, at Oswego, N. Y., in 1816, and in 1832 the first steamer made the trip from Lake Erie to Chicago. Previous to 1841, when the *Vandalia* was launched, all of the lake steamers were of the side-wheel type. In 1843 seven more propellers were constructed, and by 1850 there were 50 propellers, aggregating 13,247 gross tons. Motor vessels appeared in 1897, but no separate record was kept of their number and tonnage until 1915. In that year they numbered 773, with a gross tonnage of 9,902, and in 1929 the number of documented motor vessels had increased to 907 and the tonnage to 54,727.

When the State of Michigan completed a canal around the rapids at Sault Ste. Marie in 1855, capable of passing vessels drawing up to 11½ feet, Lake Superior was open to the small vessels then in use. Up to this time Lake Superior had not been included in the main traffic lines established.

During the 10-year period, 1881 to 1890, when the navigation improvements undertaken by the National Government were becoming available, the lake commerce began to progress. The most important project brought to completion during this period was the ship canal at Sault Ste. Marie, which provided a draft of 18 feet and supplanted the 11½-foot canal built and maintained by the State of Michigan.

Developments in shipbuilding during and following this period reflected the increased navigable capacity of the channels and lake harbors. In 1881, 65,000 tons of vessels were constructed, about 75 per cent of which were in steam vessels averaging about 450 tons. Previous to this time the average steamer was but little over 200 gross tons. In 1884, steam vessels, while yet outnumbered, exceeded the tonnage in sailing vessels. From 1886 on, the fleet increased in keeping with better navigation conditions, and steamships of 2,000 tons were common when a few years before steamers of 1,000 tons were rare.

The vessel tonnage on the Great Lakes reached 1,000,000 in 1891, with a constant ascendency of steamers over sailing vessels. In 1905 the total vessel tonnage was over 2,000,000, included in which were 1,820 steamers with an aggregate tonnage of 1,647,793 tons, and in 1919 the 3,000,000 mark was reached. Since that time there has been a gradual recession in the total gross tonnage of vessels in the United States registry on the Great Lakes, until in 1929 it dropped to 2,763,920 tons.

The following table illustrates the development of the United States Great Lakes fleet.

TABLE NO. 3.—*Number and gross tonnage of steam, gas, and sailing vessels and barges on the Great Lakes, 1868–1929*

[United States registry]

Year	Total		Steam vessels [1]		Gas vessels		Sailing vessels		Barges	
	Number	Tons	Number	Tons	Number	Tons	Number	Tons	Number	Tons
1868	2,543	454,051	624	144,117	----------	--------	1,855	293,978	64	15,956
1869	2,491	446,201	636	146,236	----------	--------	1,752	277,893	103	22,072
1870	2,455	435,151	642	142,973	----------	--------	1,699	264,609	114	27,569
1871	2,476	447,829	682	149,468	----------	--------	1,662	267,153	132	31,208
1872	2,523	470,437	708	162,523	----------	--------	1,654	270,051	161	37,863
1873	2,642	520,811	802	180,250	----------	--------	1,663	298,002	177	42,559
1874	2,788	581,246	876	198,121	----------	--------	1,696	336,802	216	46,323
1875	2,794	587,234	891	202,307	----------	--------	1,710	339,787	193	45,140
1876	1,752	578,825	921	201,742	----------	--------	1,643	331,498	188	45,585
1877	2,719	572,686	923	201,085	----------	--------	1,604	324,394	192	47,207
1878	2,647	562,754	918	201,550	----------	--------	1,546	315,908	183	45,296

TABLE NO. 3.—*Number and gross tonnage of steam, gas; and sailing vessels and barges on the Great Lakes, 1868–1929*—Continued

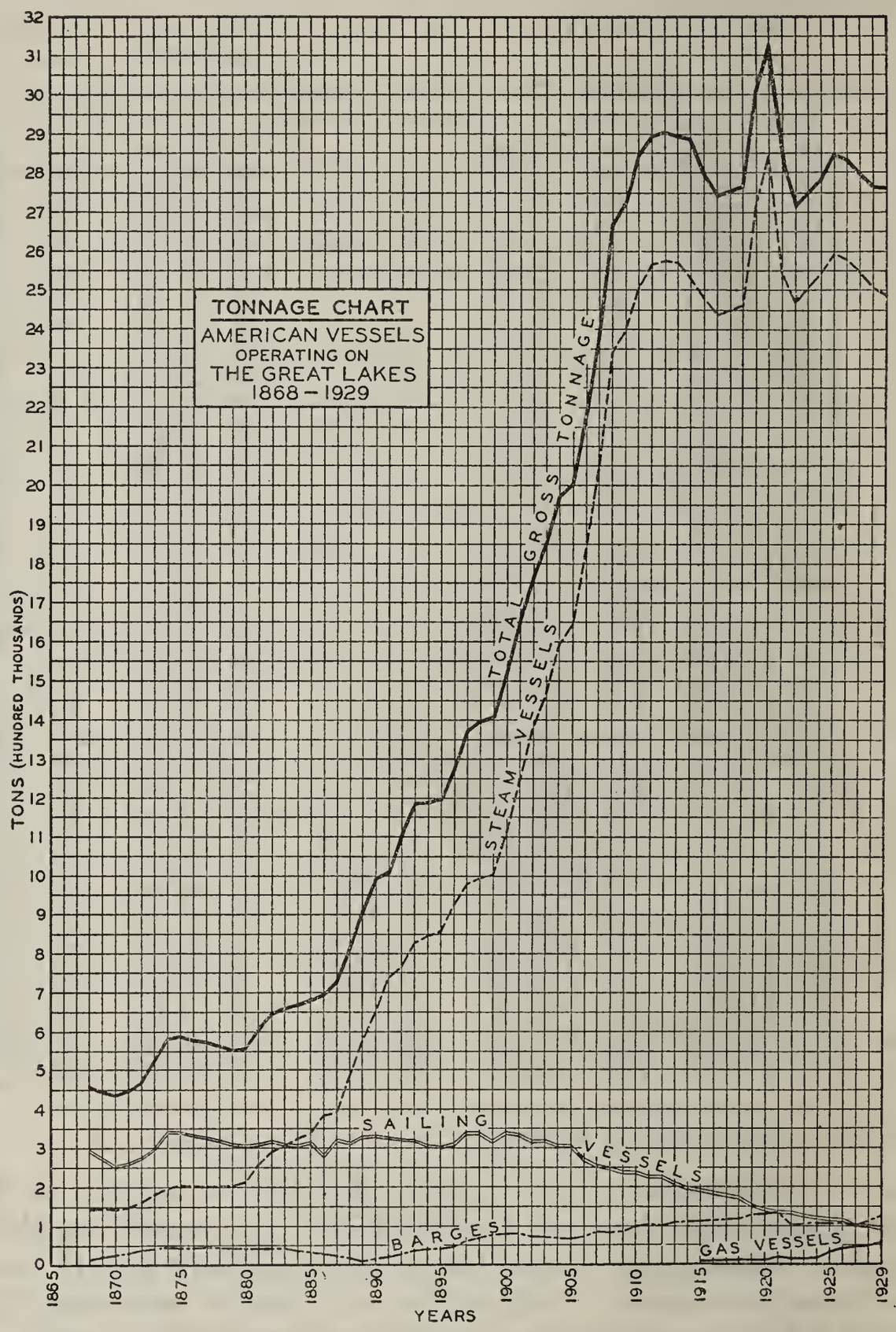
[United States registry]

Year	Total		Steam vessels [1]		Gas vessels		Sailing vessels		Barges	
	Number	Tons	Number	Tons	Number	Tons	Number	Tons	Number	Tons
1879	2,539	552,602	896	203,298			1,473	307,078	170	42,226
1880	2,555	557,943	931	212,045			1,459	304,933	165	40,965
1881	2,567	608,003	988	260,114			1,417	306,436	162	41,453
1882	2,677	648,814	1,101	292,257			1,412	313,651	164	42,906
1883	2,678	658,670	1,149	304,641			1,373	310,454	156	43,575
1884	2,624	664,488	1,165	322,456			1,333	307,933	126	34,099
1885	2,608	679,798	1,175	335,859			1,322	313,129	111	30,810
1886	2,616	690,358	1,280	381,907			1,235	282,319	101	26,132
1887	2,595	727,234	1,225	390,397			1,286	315,079	84	21,758
1888	2,697	813,097	1,342	480,138			1,277	314,765	78	18,194
1889	2,784	907,664	1,455	575,307			1,285	325,083	44	7,274
1890	2,853	995,489	1,527	652,923			1,272	328,656	54	13,910
1891	2,897	1,082,355	1,592	736,752			1,243	325,131	62	20,472
1892	2,926	1,108,002	1,631	763,063			1,226	319,618	69	25,321
1893	3,018	1,184,223	1,731	828,702			1,205	317,789	82	37,732
1894	2,955	1,185,439	1,731	843,240			1,139	302,985	85	39,214
1895	2,936	1,197,385	1,755	857,735			1,100	300,642	81	39,008
1896	2,917	1,278,958	1,792	924,631			1,044	309,152	81	45,175
1897	2,869	1,372,124	1,775	977,235			993	334,104	101	60,785
1898	2,872	1,397,044	1,764	993,644			960	333,704	148	69,696
1899	2,796	1,407,718	1,732	1,014,561			874	318,175	190	74,982
1900	2,775	1,524,157	1,739	1,110,565			832	335,183	204	78,409
1901	2,777	1,655,932	1,778	1,243,500			784	332,289	215	80,143
1902	2,718	1,768,623	1,795	1,377,872			726	318,032	197	72,719
1903	2,657	1,854,948	1,796	1,467,992			676	315,195	185	71,761
1904	2,624	1,972,048	1,820	1,592,270			623	308,820	181	70,958
1905	2,593	2,018,372	1,820	1,647,793			583	301,115	190	69,464
1906	2,572	2,183,833	1,844	1,841,438			519	269,136	209	73,259
1907	2,574	2,383,852	1,873	2,044,553			466	256,104	235	83,195
1908	2,626	2,671,560	1,942	2,341,686			429	248,752	255	81,122
1909	2,642	2,723,728	1,982	2,399,925			389	238,491	271	85,312
1910	2,793	2,844,190	2,107	2,508,469			362	236,656	324	99,065
1911	2,837	2,895,458	2,174	2,564,060			324	228,519	339	102,879
1912	2,916	2,901,716	2,269	2,575,914			303	225,114	344	100,688
1913	2,975	2,888,738	2,333	2,568,983			272	210,401	370	109,354
1914	2,958	2,834,525	2,339	2,523,517			241	198,531	378	112,477
1915	2,953	2,795,280	1,615	2,478,043	733	9,902	220	190,928	385	116,407
1916	2,940	2,745,171	1,590	2,434,603	775	9,915	191	182,225	384	118,428
1918	2,874	2,764,915	1,508	2,461,671	801	10,056	165	172,836	400	120,352
1919	2,940	3,012,237	1,541	2,721,079	839	10,473	125	151,383	435	129,302
1920	3,010	3,129,532	1,586	2,845,714	870	10,841	108	142,067	446	130,910
1921	2,861	2,829,541	1,432	2,544,831	876	14,317	95	136,074	458	134,319
1922	2,678	2,716,170	1,353	2,468,802	875	11,450	86	133,100	364	102,818
1923	2,653	2,750,873	1,351	2,506,070	860	11,490	83	129,753	359	103,560
1924	2,635	2,784,680	1,320	2,544,515	867	12,009	75	120,175	373	107,981
1925	2,613	2,845,651	1,311	2,592,000	874	30,088	70	118,982	358	104,581
1926	2,561	2,836,885	1,273	2,578,070	869	40,750	65	113,609	354	104,456
1927	2,494	2,797,203	1,224	2,544,894	875	45,750	58	103,259	337	103,300
1928	2,472	2,765,359	1,192	2,505,610	882	47,011	52	100,917	346	111,821
1929	2,457	2,763,920	1,159	2,486,491	907	54,727	51	99,821	340	122,881

[1] Years 1897 to 1914, steamers include gas vessels.

Since a presentation of the vessels admitted to registry in the United States only, does not account for all the vessels regularly engaged in traffic on the Great Lakes, it is necessary to add those under Canadian registry. Tables Nos. 4, 5, and 6 were especially prepared for this report by the maritime records division, bureau of research, United States Shipping Board, and give the status of the Great Lakes fleet as of October 1, 1929. The information is limited to ships of 1,000 gross tons and over, and excludes such craft as tugs, wreckers, dredgers, sand suckers, etc. The Great Lakes commercial fleet, as given, comprises a total of 793 vessels, of which 501, or

about 63 per cent, are under American registry, the Canadian fleet having 292 vessels. The total tonnage of the vessels shown in Table



No. 4 is 3,145,793 gross tons, of which total 2,439,170 tons, or about 78 per cent, are of American registry. The Canadian fleet comprises 706,623 gross tons.

TABLE NO. 4.—*Vessels of 1,000 gross tons and upward comprising the Great Lakes fleet October 1, 1929*

	Number of vessels	Actual gross tonnage	Construction		Propulsion				
			Steel	Wood, iron, and composite	Steam	Motor	Sail	Towed	Total
American registry:									
Bulk freight carriers	458	2,315,594	447	11	446	12	------	------	458
Combination freight and passenger	37	104,157	31	6	37	------	------	------	37
Tankers	6	19,419	6	------	5	1	------	------	6
Total	501	2,439,170	484	17	488	13	------	------	501
British Registry:									
Bulk freight carriers	259	612,790	248	11	257	2	------	------	259
Combination freight and passenger	26	79,891	24	2	26	------	------	------	26
Tankers	7	13,942	7	------	7	------	------	------	7
Total	292	706,623	279	13	290	2	------	------	292
Grand total	793	3,145,793	763	30	778	15	------	------	793

TABLE NO. 5.—*Bulk freight carriers, including all exclusive cargo carriers of 1,000 gross tons and upward, in the Great Lakes fleet, October 1, 1929*

	Number of vessels	Gross tonnage range	Construction		Length between perpendiculars			Beam			Propulsion		
			Steel	Wood, iron, and Composite	Minimum	Maximum	Average	Minimum	Maximum	Average	Steam	Motor	Total
Bulk freight carriers:													
American registry	31	1,000– 1,999	26	5	134	272	242	31	44	40	22	9	31
	54	2,000– 2,999	48	6	238	366	276	37	47	43	53	1	54
	65	3,000– 3,999	65	------	319	454	373	42	55	48	65	----	65
	95	4,000– 4,999	95	------	350	470	416	46	60	50	95	----	95
	21	5,000– 5,499	21	------	420	513	458	50	56	53	21	----	21
	12	5,500– 5,999	12	------	460	540	490	52	56	53	12	----	12
	54	6,000– 6,499	54	------	479	558	509	52	58	55	54	----	54
	38	6,500– 6,999	38	------	456	549	527	50	60	56	38	----	38
	22	7,000– 7,499	22	------	525	585	555	56	60	58	22	----	22
	35	7,500– 7,999	35	------	554	589	580	58	60	59	35	----	35
	22	8,000– 8,499	22	------	580	592	583	58	62	60	22	----	22
	6	8,500– 8,999	6	------	586	597	592	62	64	63	4	2	6
	2	9,000– 9,499	2	------	604	607	606	64	65	65	2	----	2
	----	9,500– 9,999	------	------	------	------	------	------	------	------	------	------	------
	1	10,000–10,499	1	------	------	615	615	----	65	65	1	----	1
Total	458	----------	447	11	------	------	------	------	------	------	446	12	458
British registry	180	1,000– 1,999	170	10	175	266	246	31	44	41	179	1	180
	36	2,000– 2,999	35	1	244	326	258	38	44	43	35	1	36
	15	3,000– 3,999	15	------	340	379	355	40	50	46	15	----	15
	13	4,000– 4,999	13	------	386	452	415	48	50	50	13	----	13
	2	5,000– 5,499	2	------	375	488	432	50	51	51	2	----	2
	1	5,500– 5,999	1	------	------	480	480	----	54	54	1	----	1
	2	6,000– 6,499	2	------	474	480	477	52	55	54	2	----	2
	1	6,500– 6,999	1	------	------	491	491	----	56	56	1	----	1
	5	7,000– 7,499	5	------	504	536	526	56	58	58	5	----	5
	1	7,500– 7,999	1	------	------	546	546	----	60	60	1	----	1
	1	8,000– 8,499	1	------	------	582	582	----	60	60	1	----	1
	1	8,500– 8,999	1	------	------	604	604	----	59	59	1	----	1
	1	10,000–10,499	1	------	------	621	621	----	70	70	1	----	1
Total	259	----------	248	11	------	------	------	------	------	------	257	2	259
Total, bulk freight carriers	717	----------	695	22	------	------	------	------	------	------	703	14	717

TABLE NO. 6.—*Tankers in the Great Lakes fleet, October 1, 1929*

	Number of vessels	Gross tonnage range	Steel construction	Length between perpendiculars			Beam			Propulsion		
				Minimum	Maximum	Average	Minimum	Maximum	Average	Steam	Motor	Total
Tankers:												
American registry	2	1,000–1,999	2	242	242	242	37	37	37	2	------	2
	1	2,000–2,999	1	------	334	334	------	51	51	------	1	1
	2	4,000–4,999	2	380	380	380	52	52	52	2	------	2
	1	5,000–5,499	1	------	420	420	------	55	55	1	------	1
Total	6	----------	6	------	------	------	------	------	------	5	1	6
British registry	3	1,000–1,999	3	248	250	249	42	43	43	3	------	3
	4	2,000–2,999	4	250	250	250	43	43	43	4	------	4
Total	7	----------	7	------	------	------	------	------	------	7	------	7
Total, tankers	13	----------	13	------	------	------	------	------	------	12	1	13

Tables Nos. 7 and 8, compiled from data contained in the annual report of the Lake Carriers' Association for 1928, give as fair a representation of the vessels engaged in the different kinds of traffic on the Great Lakes as can be presented, both as to gross tonnage and carrying capacities. Such craft as lighters, sand suckers, sand scows, tugs and wreckers are not included, neither are small old-time craft lacking in stanchness for sea service.

One year after the close of the World War, or at the end of 1919, a similar compilation showed a total of 774 vessels of 2,694,447 gross registered tons. The present lake fleet consists of 839 vessels of 3,194,368 gross tons. The increase in steel bulk freighters of United States registry totals 64, representing 258,503 gross tons. A more imposing increase has been made in the Canadian fleet since 1919 when the Canadian fleet was at a low ebb as a result of the war and numbered only 38 steamers of 131,822 gross tonnage. Through new construction and extensive purchasing, the Canadian steel bulk freight steamers now total 197 of 491,865 gross registered tonnage. Since 1919 the decline in United States and Canadian wooden steamers and barges has been marked, a total of 147 having been removed from the coal and grain trades.

TABLE NO. 7.—*Gross tonnages of vessels on the Great Lakes by types and trades, 1928*

Types of vessels and principal trade	United States registry		Canadian registry		Total	
	Number	Total gross tonnage	Number	Total gross tonnage	Number	Total gross tonnage
STEAMERS						
BULK						
Ore, coal, grain [1]	332	1,900,930	184	464,769	516	2,365,699
Coal, grain, salt, pulp [1]	19	43,634	------	------	19	43,634
Sand, gravel [1]	19	33,428	4	7,187	23	40,615
Coal, grain [2]	2	3,431	4	5,802	6	9,233
Self-unloading, coal, cement, stone [1]	25	116,682	------	------	25	116,682
Self-unloading, coal [1]	------	------	5	11,148	5	11,148
Self-unloading, grain [1]	------	------	1	2,027	1	2,027
Not in commission [3]	3	6,085	------	------	3	6,085
Not in commission [1]	------	------	3	6,734	3	6,734
Total, bulk freight steamers	400	2,104,190	201	497,667	601	2,601,857
PACKAGE						
Package freight, hard coal, grain [1]	29	103,476	------	------	29	103,476
Package freight, grain [4]	------	------	22	45,247	22	45,247
Total, package, freight steamers	29	103,476	22	45,247	51	148,723
PASSENGER						
(1)	33	98,238	15	44,471	48	142,709
(5)	5	5,748	------	------	5	5,748
(7)	------	------	2	2,690	2	2,690
Total, passenger steamers	38	103,986	17	47,161	55	151,147
MISCELLANEOUS						
Automobiles [1]	11	36,138	------	------	11	36,138
Automobiles, coal, salt, lumber [5]	21	21,617	------	------	21	21,617
Car ferry [1]	28	73,160	4	13,424	32	86,584
Total, miscellaneous steamers	60	130,915	4	13,424	64	144,339
Total, all steamers	------	------	------	------	771	3,046,066
MOTOR (BULK)						
Ore, coal [1]	2	17,503	------	------	2	17,503
Self-unloading, steel products [1]	4	6,780	------	------	4	6,780
Total, motor vessels	6	24,283	------	------	6	24,283
BARGES (BULK)						
Ore [1]	15	52,978	------	------	15	52,978
Ore, coal, grain, pulp [1]	8	22,407	------	------	8	22,407
Coal, lumber, sand, gravel [1]	5	10,059	------	------	5	10,059
Coal, grain [1]	------	------	17	19,146	17	19,146
Coal, sand [6]	------	------	4	2,376	4	2,376
Coal, lumber, pulp [6]	13	17,053	------	------	13	17,053
Total, barges	41	102,497	21	21,522	62	124,019
Grand total, all vessels	574	2,569,347	265	625,021	839	3,194,368

[1] Steel. [2] Composite or iron. [3] Steel or composite. [4] Steel or iron. [5] Wood or iron. [6] Wood. [7] Iron.

TABLE NO. 8.—*Carrying capacity of vessels on the Great Lakes by types and trades, 1928*

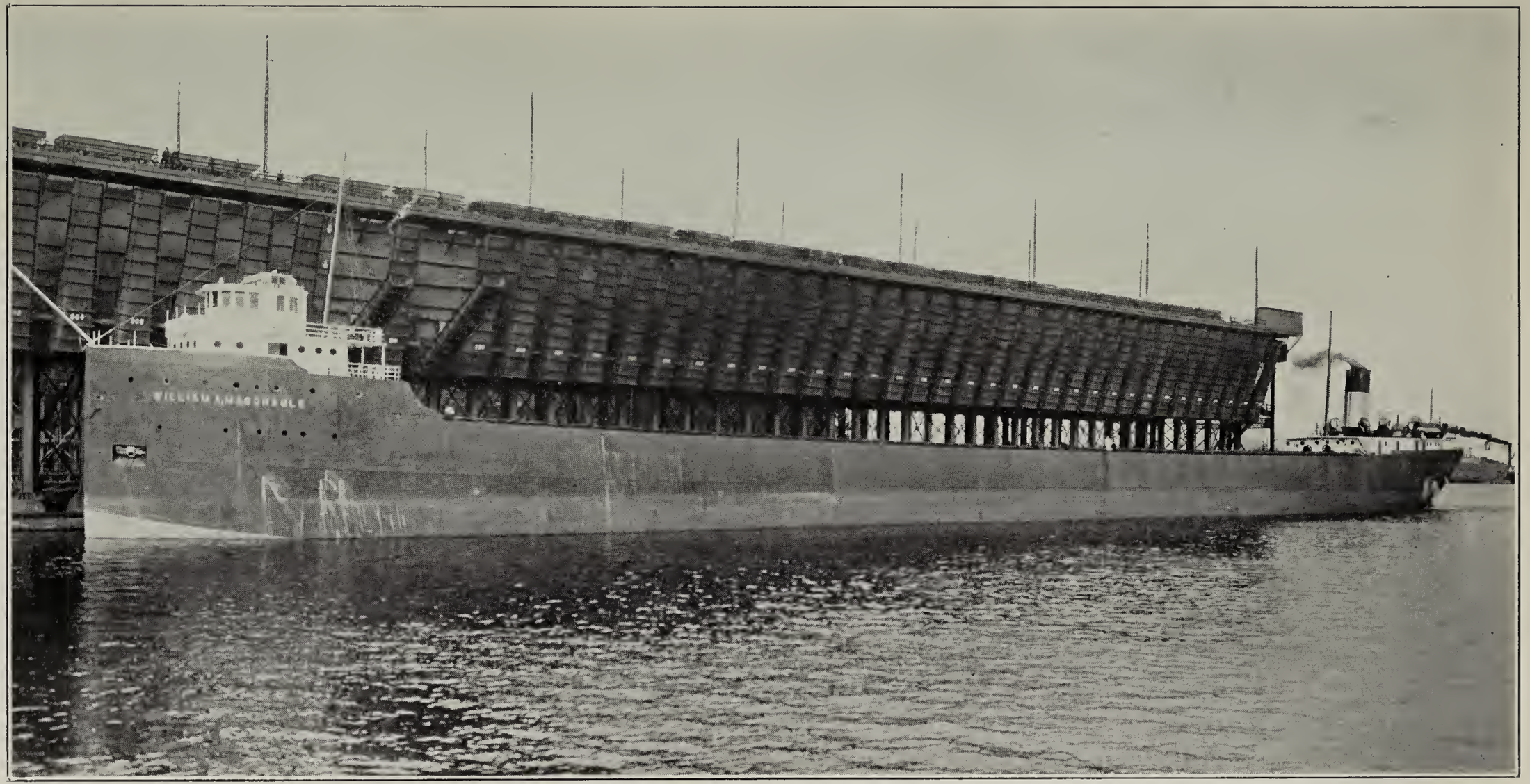
Types of vessels and principal trade	United States registry		Canadian registry		Total	
	Number	Capacity, gross tons	Number	Capacity, gross tons	Number	Capacity, gross tons
STEAMERS						
BULK						
Ore, coal, grain [1]	332	2,720,700	184	666,300	516	3,387,000
Coal, grain, salt, pulp [1]	19	53,200	------	------	19	53,200
Sand, gravel [1]	19	52,050	4	10,400	23	62,450
Coal, grain [2]	2	5,100	4	9,100	6	14,200
Self-unloading, coal, cement, stone [1]	25	155,300	------	------	25	155,300
Self-unloading, coal [1]	------	------	5	13,400	5	13,400
Self-unloading, grain [1]	------	------	1	2,600	1	2,600
Not in commission [3]	3	8,400	------	------	3	8,400
Not in commission [1]	------	------	3	10,000	3	10,000
Total, bulk freight steamers	400	2,994,750	201	711,800	601	3,706,550
PACKAGE						
Package freight, hard coal, grain [1]	29	125,800	------	------	29	125,800
Package freight, grain [4]	------	------	22	57,200	22	57,200
Total, package freight steamers	29	125,800	22	57,200	51	183,000
MISCELLANEOUS						
Automobiles [1]	11	51,200	------	------	11	51,200
Automobiles, coal, salt, lumber [5]	21	29,550	------	------	21	29,550
Total, miscellaneous	32	80,750	------	------	32	80,750
Total, all steamers	461	3,201,300	223	769,000	684	3,970,300
MOTOR (BULK)						
Ore, coal [1]	2	21,800	------	------	2	21,800
Self-unloading, steel products [1]	4	10,000	------	------	4	10,000
Total, motor vessels	6	31,800	------	------	6	31,800
BARGES (BULK)						
Ore [1]	15	93,700	------	------	15	93,700
Ore, coal, grain, pulp [1]	8	42,100	------	------	8	42,100
Coal, coke. lumber, sand, gravel [1]	5	17,500	------	------	5	17,500
Coal, grain [1]	------	------	17	32,800	17	32,800
Coal, sand [6]	------	------	4	3,000	4	3,000
Coal, lumber, pulp [6]	13	28,300	------	------	13	28,300
Total, barges	41	181,600	21	35,800	62	217,400
Grand total, all vessels	508	3,414,700	244	804,800	752	4,219,500

[1] Steel.
[2] Steel or composite.
[3] Composite or iron.
[4] Steel or iron.
[5] Wood or iron.
[6] Wood.

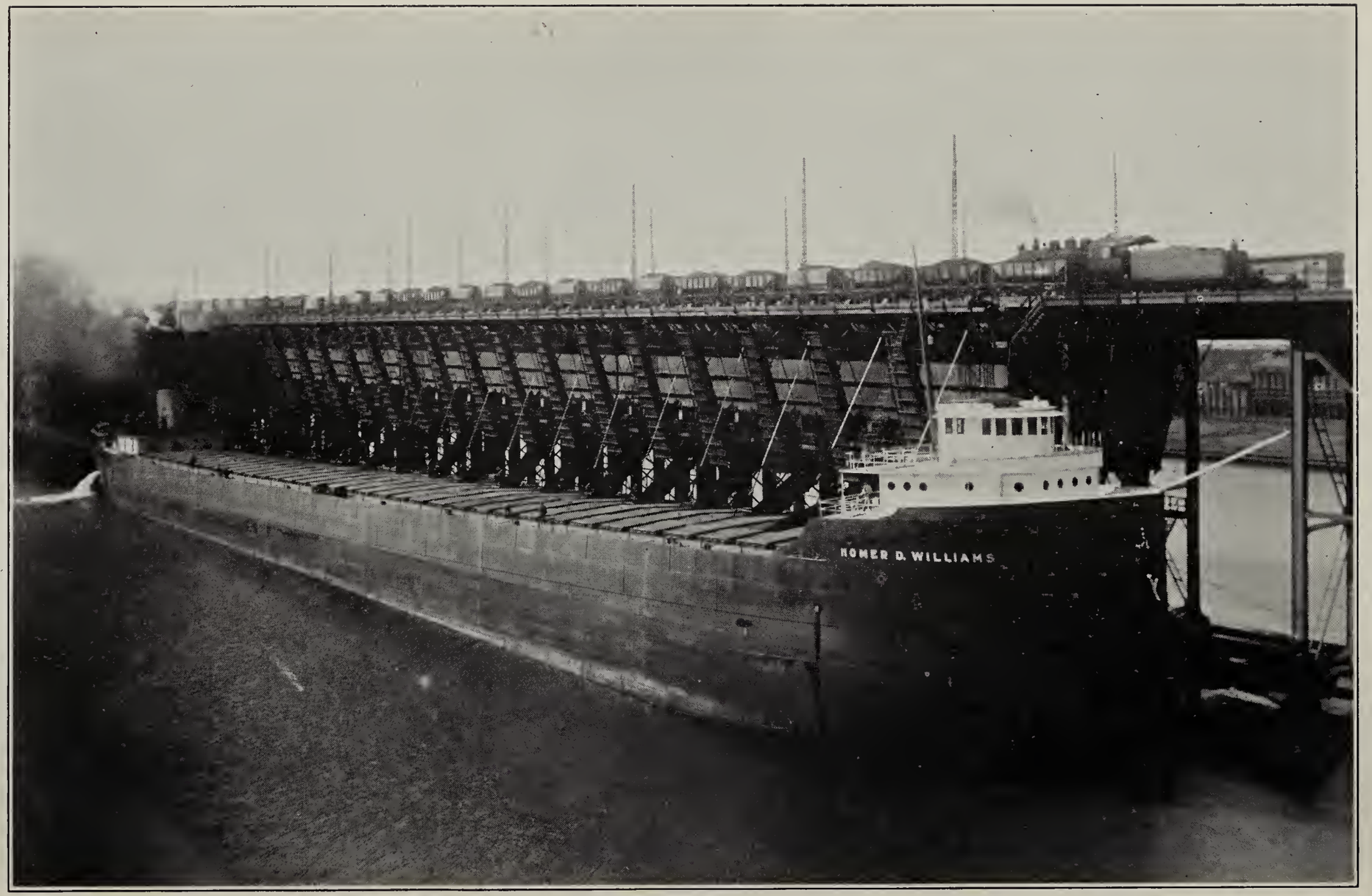
THE BULK FREIGHTER

The modern bulk freighter is the most interesting type of ship navigating the Great Lakes. The enormous volume of traffic in bulk freight to be transported in a limited navigation season created a demand, the response to which is the bulk freighter of present-day design and proportion. These vessels are constructed to standards which permit of greatest efficiency in loading and discharging cargo. As a class, they are the most economical carriers of bulk freight yet devised.

The typical bulk carrier has its power plant far aft and its quarters in the extreme forward end. All the spaces lying between is un-



STEAMER "WILLIAM A. McGONAGLE" AT DULUTH-SUPERIOR ORE DOCK



STEAMER "HOMER D. WILLIAMS" LOADING ORE AT DULUTH, MISSABE & NORTHERN RY. DOCK NO. 5, DULUTH-SUPERIOR

obstructed cargo hold. The hatches are separated only by the width of the thwarts which are usually spaced 12 feet between centers. This spacing has become standard for ore carriers. There are no bulkheads or compartments in the hold. The usual number of hatches is between 12 and 30, although some vessels have as many as 40.

The vessel dimensions have a direct relation to the pier loading facilities. Ore piers have been developed to work efficiently with the carriers. Their discharging pockets are designed on 12-foot spacing. In this manner, pier pockets and ship hatches are brought into co-ordination and loading of the vessel is performed with the greatest possible dispatch.

The Canadian steamer *Lemoyne*, the largest of the Lake fleet, was built at Midland, Ontario, in 1926. The dimensions are 633 feet long overall; 620 feet long on the keel; 70 feet breadth of beam, and her Canadian measurement of 29 feet depth corresponds with a depth of 33 feet under United States measurement. The cargo hold, which is 474 feet long by 60 feet wide, is divided into seven compartments by screen bulkheads, and access to the cargo space is provided through 25 hatches, spaced at 18-foot centers, which spacing is a new departure and to be found only in the Midland-built boats *Gleniffer*, *Gleneagles*, and *Lemoyne*. The *Lemoyne's* gross tonnage is 10,480 and her largest cargo, thus far, has been 16,668 net tons, consisting of 566,169 bushels of wheat and flax.

LOADING RECORDS

The ore-loading record is held by the steamer *D. G. Kerr* which, on September 7, 1921, loaded 12,508 gross tons of iron ore in 16½ minutes at the Duluth & Iron Range Railroad ore dock, Two Harbors, Minn. This was at the rate of 758 tons per minute or at an hourly rate of 45,484 gross tons.

The bituminous coal loading record was made by the steamer *D. G. Kerr* at the Pittsburgh & Conneaut Dock, Conneaut, Ohio, on July 30, 1921, when 13,877 tons of cargo coal and 369 tons of fuel coal were loaded in 4 hours and 30 minutes, or at the rate of 3,166 tons per hour.

The record for loading anthracite coal is held by the steamer *Crete*, which in 1920 loaded 9,606 net tons of coal in 6 hours and 50 minutes, or at the rate of 1,406 tons per hour. The largest cargo of hard coal ever carried on the Great Lakes was loaded in 1920 by the steamer *Henry G. Dalton* at the Delaware, Lackawanna & Western Dock at Buffalo, N. Y. The cargo of 14,614 net tons was loaded in 11 hours and 15 minutes, or at the rate of 1,299 tons per hour.

The speed record for loading grain is held by the steamer *George H. Ingalls*, formerly the *Wm. L. Brown*, which loaded 130,000 bushels of wheat in one hour at the Terminal Elevator, Fort William, Ontario, on November 23, 1923. On August 13, 1928, the Canadian steamer

Lemoyne loaded 555,000 bushels of wheat at Fort William-Port Arthur, Ontario, in 7 hours and 20 minutes, or at the rate of 75,680 bushels per hour.

The records for loading limestone is held by the steamer *Conneaut*. This vessel loaded 7,145 net tons of stone in 38 minutes on June 26, 1926, at Alpena, Mich. This is at the rate of 10,115 tons per hour.

UNLOADING RECORDS

The ore-unloading record is held by the steamer *Wm. G. McGonagle*. This vessel discharged 11,445 gross tons of iron ore at the Pittsburgh & Conneaut Dock, Conneaut, Ohio, in 2 hours and 20 minutes, or at the rate of 4,905 tons per hour.

The record for unloading coal is held by the steamer *Elbert H. Gary*, which in 1928 discharged 9,366 net tons of bituminous coal at the Duluth, Missabe & Northern Dock, Duluth, Minn., in 6 hours and 5 minutes, or at the rate of 1,540 tons per hour.

The wheat unloading record was made in 1917 by the steamer *Shenango*. This vessel discharged 451,382 bushels of wheat in 15 hours or at the rate of 30,092 bushels per hour.

The record for unloading limestone was established August 9, 1928, by the steamer *Carl D. Bradley* which (using its own equipment) discharged 15,633 gross tons of stone in 5 hours and 21 minutes, or at the rate of 2,922 gross tons per hour.

The record for discharging iron ore and loading a cargo of soft coal was made by the steamer *Harry Coulby* on August 13, 1928. Iron ore, in the amount of 13,994 gross tons, was discharged in 4 hours and 45 minutes, and 14,985 tons of soft coal loaded in 5 hours and 45 minutes. The total time required for these operations was 10 hours and 30 minutes for a total of 30,658 net tons.

SEASONAL PERFORMANCES OF BULK FREIGHTERS

The self-unloading steamer *Huron* established an all-time record for number of cargoes and tonnage carried on the Great Lakes during the navigation season of 1928. Starting out on April 1 and completing her final trip on December 1, this vessel handled 57 cargoes of stone aggregating 480,814 tons, and 73 cargoes of soft coal with a total of 442,019 tons, making a grand total of 130 cargoes and 992,833 net tons of freight carried.

A record was made in 1924 when the steamer *William K. Field* delivered a total of 552,014 tons of ore and coal during her navigation season of 7 months and 17 days. This vessel is a typical bulk carrier 600 feet long, 60-foot beam, and 32 feet molded depth, having a gross tonnage of 8,200, a deadweight of 13,000 gross tons, and a rated speed of 12 miles per hour. During the season this vessel carried 24 cargoes of coal westbound, mostly between Ashtabula and Duluth,

and 22 cargoes of ore eastbound from Allouez, Wis., to Ashtabula, Ohio. Only two trips were made deviating from this route, one between Ashtabula and Sheboygan, Wis., and one between Lorain, Ohio, and Green Bay, Wis. This record was made in the face of lowered lake levels, the average draft being 19 feet. An almost balanced cargo record was the prime factor in the vessel's performance. Cargoes were taken both ways on every trip except one, when the ship went in ballast from Green Bay, Wis., to Lake Erie.

The tonnage handled by the steamer *William K. Field* was exceeded by the steamer *James MacNaughton* both in 1925 and 1927, but no detailed data are available.

Following is a record of the maximum performances of individual vessels on the Lakes from 1906 to 1928, inclusive, as taken from Soo Canal and other records:

TABLE No. 9.—*Maximum vessel performances*

Year	Vessel	Net tons moved	Year	Vessel	Net tons moved
1906	Elbert H. Gary	313,434	1918	Col. Jas. M. Schoonmaker	464,224
1907	J. Pierpont Morgan	339,151	1919	Homer D. Williams	378,142
1908	do	289,952	1920	Eugene W. Pargney	417,321
1909	Edward Y. Townsend	312,196	1921	Merton E. Farr	395,793
1910	Henry H. Rogers	309,339	1922	Henry G. Dalton	405,220
1911	Shenango	321,338	1923	James MacNaughton	491,394
1912	Col. Jas. M. Schoonmaker	374,014	1924	William K. Field	531,876
1913	do	442,341	1925	James MacNaughton	554,100
1914	Shenango	355,864	1926	William C. Atwater	442,016
1915	Percival Roberts, jr	377,620	1927	James MacNaughton	554,978
1916	Col. Jas. M. Schoonmaker	464,725	1928	William C. Atwater	487,888
1917	William B. Schiller	419,742			

Record performances are made possible by the dispatch with which vessels are handled in port. The average stay in port is illustrated by the following table, compiled from the records of one of the largest fleets engaged in the ore and coal trade. It is taken from the annual report of the Lake Carriers' Association for 1928.

TABLE No. 10.—*Average stay in port, 1920–1928*

	1920	1921	1922	1923	1924	1925	1926	1927	1928
Average stay in lower lake ports	*H. m.* 34 3	*H. m.* 0 54	*H. m.* 3 32	*H. m.* 17 43	*H. m.* 21 17	*H. m.* 18 14	*H. m.* 15 4	*H. m.* 13 37	*H. m.* 13 19
Average stay in upper lake ports	9 30	7 31	6 19	5 47	5 55	5 29	4 36	4 5	3 8
Average time spent in port receiving and discharging cargoes	44 3	28 25	29 51	23 30	27 12	23 43	0 10	17 42	17 17
[Long tons of cargo]									
Average cargo carried	8,475	10,147	8,402	8,122	8,453	7,839	7,388	8,568	8,856
Largest cargo carried	13,912	12,796	12,370	13,167	12,504	12,335	11,497	14,532	14,859
Fastest loading record	12,237	12,382	11,007	10,706	6,529	7,382	10,342	9,101	5,470
	H. m. 1 35	*H. m.* 0 16½	*H. m.* 1 35	*H. m.* 1 30	*H. m.* 0 45	*H. m.* 0 50	*H. m.* 1 10	*H. m.* 1 0	*H. m.* 0 30
Rate of fastest loading record per hour	7,730	45,024	6,977	7,137	8,700	8,850	8,865	9,101	10,940

RECORD CARGOES OF LAKE BULK FREIGHTERS

While the lake traffic of 1927 was conspicuous because of record cargoes made during that year, even these were exceeded in 1928. The largest cargo ever transported on the Great Lakes was in September, 1928, when the steamer *Carl D. Bradley* carried 18,043 short tons of limestone from Calcite, Mich., to Buffington, Ind. On September 26, 1928, the steamer *Donnacona* carried 16,642 short tons of iron ore from Marquette to Sault Ste. Marie, Ontario. The steamer *Harry Coulby* carried 15,949 short tons through the Soo Canal to a Lake Erie port on August 29, 1928. On August 13, 1928, the Canadian steamer *Lemoyne* carried 555,000 bushels, or 16,650 tons of wheat from Fort William-Port Arthur, Ontario. On September 10, 1928, the same vessel carried a mixed cargo of wheat and barley totaling 595,521 bushels, or 15,699 short tons, and again on November 13, 1928, exceeded all previous tonnages when she carried a total of 566,169 bushels of wheat and flax, aggregating 16,668 short tons.

During the navigation season of 1928 the conditions at the wharves and in the channels of the Great Lakes system limited the draft of vessels to about 20 feet. With the loss of every inch of draft below 20 feet, the modern lake bulk freighter suffers a loss of from 90 to 100 tons in cargo capacity. It will gain a corresponding amount for every inch of draft in excess of 20 feet.

The following tabulation shows the largest cargoes passing through the St. Marys Falls Canal, together with the limits of draft prevailing for the navigation seasons 1919 to 1928, inclusive.

TABLE NO. 11.—*Largest cargoes passing St. Marys Falls Canal, 1919–1928*

NAVIGATION SEASON—RECORD FOR YEAR

Year	Limit of draft on Great Lakes system	Vessel	Cargo	Length of vessel
	Feet		*Net tons*	*Feet*
1919	21	Donnacona	15,500	625
1920	21	William J. Filbert	15,581	585
1921	20	Donnacona	15,456	625
1922	20	Col. J. M. Schoonmaker	14,500	590
1923	19½	Fred G. Hartwell	14,784	603
1924	19	do	13,970	603
1925	18½	R. Trimble	13,248	580
1926	18¾	Lemoyne	15,900	633
1927	19¼	do	15,500	633
1928	20	do	16,650	633

SELF-UNLOADERS

Bulk freight carriers especially designed and equipped with unloading apparatus now number 43 on the Great Lakes. Some of these were former ore freighters that were changed to meet the demand for carriers of stone, coal, sand, and gravel to ports where there are no adequate facilities for discharging.

The original type of unloader has hopper cargo holds which discharge the cargo to an endless belt conveyor running beneath the holds. This belt in turn discharges to a bucket conveyor lift which carries the commodity to the discharging boom at the bow of the vessel. These booms are capable of being lifted to a height of 65 feet above the ground and can discharge cargo 115 feet from the side of the vessel.

The largest of the stone-carrying fleet is the new *Carl D. Bradley*, 638¾ feet long over all, 615 feet between perpendiculars, and 65 feet in breadth. This vessel has carried 14,756 gross, or 16,526 net tons of stone from Calcite, Mich., to Buffington, Ind., on a draft of 22 feet forward and 22 feet 4 inches aft. This cargo was discharged on August 3, 1927, and became the first 16,000 net ton cargo ever carried on the Great Lakes. In September, 1928, this vessel carried the record cargo of 16,110 gross tons, equalling 18,043 net tons, from Calcite to Buffington.

The following table, especially prepared by the bureau of research, United States Shipping Board, from the register of the American Bureau of Shipping, gives the name, date of construction, dimensions, gross tonnage, and ownership of this special type now operating on the Great Lakes.

TABLE NO. 12.—*Self-unloading vessels in Great Lakes service, by flag, year built, gross tons, dimensions, and owners*

Name of vessel	Flag	Year built	Gross tons	Length between perpendiculars	Breadth	Depth	Owners
Alpena	American	1909	2,886	356.0	47.2	26.0	Wyandotte Transportation Co.
Andaste	do	[1] 1892	1,439	246.0	38.0	22.4	Leatham B. Smith Cliffs Co.
B. H. Taylor	do	1923	7,318	530.0	60.0	32.0	Bradley Steamship Co.
Bay State	do	[2] 1890	1,245	265.0	36.0	22.6	Smith-Truby Sand Co.
Bay View	do	[3] 1891	1,399	265.0	38.0	24.0	Central Dredging Co.
Bennington	do	[4] 1897	2,029	238.0	42.0	26.0	Buffalo Crystal Beach Corporation.
Brazil	do	[2] 1890	2,166	276.1	40.2	24.4	Illinois Ship & Dredge Co.
C. W. Cadwell	British	1911	564	155.0	37.0	10.0	Ontario Gravel Freighting Co.
Calcite	American	1912	3,996	416.0	54.0	29.0	Bradley Transportation Co.
Charles C. West	do	1925	6,644	450.2	60.0	31.0	Rockfort Steamship Co.
Carl D. Bradley	do	1927	10,028	615.0	65.0	33.0	Bradley Transportation Co.
Charles Heiden	do	1913	717	160.0	35.0	14.0	Detroit Material & Transportation Co.
Colfax	British	1927	2,482	253.0	43.2	25.0	Coal Carriers Corporation.
Collier	do	1924	1,858	250.0	43.0	20.0	Canada Steamship Lines.
Colonel E. M. Young	American	1905	6,421	504.0	54.0	30.0	United Steamship Co.
Conneaut	do	1916	4,749	416.0	56.0	30.0	Wyandotte Transportation Co.
Daniel McCool	do	1926	649	144.0	33.0	15.0	Cement Transit Co.
Eastrich	British	1890	2,027	266.0	38.0	23.0	Jas. Richardson & Sons (Ltd.).
Fontana	American	1904	3,887	356.0	50.0	28.0	Progress Steamship Co.
Frank C. Osborn	do	1912	681	155.0	37.0	10.0	Detroit Material & Transportation Co.
Fred W. Green	do	[5] 1918	2,292	253.6	43.6	22.6	John J. Roen.
Glenelg	British	1923	2,098	252.0	43.0	25.6	Canada Steamship Lines.
Huron	American	1914	4,810	416.0	56.0	30.0	Wyandotte Transportation Co.
J. A. Pearson	do	1898	1,290	220.0	40.0	16.0	F. D. Gleason Coal Co.
J. E. Savage	do	1901	4,260	394.0	48.0	28.0	Morrow Steamship Co.
John G. Munson	do	1917	7,203	530.0	60.0	32.0	Bradley Transportation Co.

[1] Rebuilt in 1921. [2] Rebuilt in 1926. [3] Rebuilt in 1924. [4] Rebuilt in 1929. [5] Rebuilt in 1927.

TABLE No. 12.—*Self-unloading vessels in Great Lakes service, by flag, year built, gross tons, dimensions, and owners*—Continued

Name of vessel	Flag	Year built	Gross tons	Length between perpendiculars	Breath	Depth	Owners
John McCartney Kennedy.	American	[2] 1903	3,845	354.0	48.0	28.0	Valley Camp Steamship Co.
Lagonda	do	[2] 1896	3,647	366.0	45.0	26.7	Interlake Steamship Co.
Michigan	do	[6] 1903	3,812	370.0	48.0	28.0	Great Lakes Dredge Co.
Midland Prince	British	[4] 1907	6,339	466.0	55.0	31.0	Canada Steamship Lines.
S. B. Way	American	1902	3,582	346.0	48.0	28.0	Valley Camp Steamship Co.
Samuel Mitchell	do	[7] 1892	2,277	293.0	40.0	24.6	Huron Transportation Co.
Sandcraft	do	1918	2,054	251.0	43.6	20.0	Construction Materials Co.
Sandmaster	do	1918	1,849	251.0	43.6	20.0	Do.
Sinaloa	do	1903	4,539	416.0	50.0	28.0	Superior Steamship Co.
Sumatra	do	[4] 1897	4,118	406.0	48.0	28.0	Sumatra Steamship Co.
Tampico	do	[3] 1900	1,894	247.0	42.0	25.0	F. D. Gleason Coal Co.
Usona	do	1902	986	204.0	40.0	16.0	Do.
Valley Camp	British	1927	2,350	252.0	43.3	26.3	Valley Camp Coal Co.
Venus	American	1901	3,719	346.0	48.0	28.0	Interlake Steamship Co.
W. E. Fitzgerald	do	1906	4,940	420.0	52.0	28.0	Chicago Navigation Co.
W. F. White	do	1915	7,180	530.0	60.0	31.0	Bradley Transportation Co.
Wyandotte	do	1908	2,450	346.0	45.2	24.0	Wyandotte Transportation Co.

[2] Rebuilt in 1926. [3] Rebuilt in 1924. [4] Rebuilt in 1929. [6] Rebuilt in 1928. [7] Rebuilt in 1918.

BULK FREIGHTER CONSTRUCTION ON THE GREAT LAKES

Exclusive of vessels constructed especially for trade through the Welland Canal, 305 bulk cargo carriers have been built for the coal, ore, grain, and stone trades on the Great Lakes, during the period 1902 to 1928, inclusive.

In 1902 a maximum length of 440 feet for vessels of this class was established when the *J. B. Cowle* was launched. The first vessels of the "600-foot class" were built in 1906, when seven such ships took the water. The largest of these was the *W. B. Kerr*, which measured 605 feet over all.

With only two exceptions, a minimum vessel length of 400 feet has been maintained since 1905, not including, of course, vessels intentionally limited to Welland Canal dimensions. These vessels were both of the self-unloading type. In 1909 the *Alpena*, 374 feet in length, was brought out for the stone trade, and in 1923 the *John W. Boardman*, a vessel 350 feet long, was commissioned in the cement trade out of Duluth.

The type of bulk freighter which has attained most economical operating proportions is the so-called "600–60–32 class" whose gross is from 7,400 to about 8,200 tons. Generally speaking, this class includes all carriers of 600 feet in length and upwards.

For the first time since 1921, lake shipyards were idle in 1928 so far as the construction of bulk freighters is concerned. Excluding the years 1918 and 1919, when the yards were engaged in the construction of 374 Shipping Board steamers, 1928 was the only year since 1886 when no metal vessels were built for the lake ore, coal, and grain trades.

The following table illustrates the trend in bulk freighter construction from 1902 to 1928, inclusive. Welland Canal size vessels are not included.

TABLE No. 13.—*Building of bulk freighters for the Great Lakes trade*

Year	Number constructed	Over-all length in feet			Carrying capacity, long tons		
		Minimum	Maximum	Average	Minimum	Maximum	Average
1902	30	366	440	399	4,800	6,500	5,470
1903	29	374	468	423	4,900	6,900	5,948
1904	7	376	560	463	5,000	10,000	7,128
1905	29	400	569	517	5,000	10,500	8,793
1906	40	400	605	531	6,500	12,000	9,530
1907	40	440	605	517	6,400	12,000	8,937
1908	24	400	569	492	5,500	10,500	8,183
1909	14	374	607	531	5,000	12,000	10,053
1910	20	465	605	538	6,800	12,000	9,570
1911	5	524	617	567	9,000	14,000	11,000
1912	2	524	617	570	9,000	14,000	11,500
1913	5	545	600	581	9,000	12,000	10,900
1914	6	524	625	545	9,000	12,000	9,666
1915	1	----	550	550	----	10,500	10,500
1916	8	472	600	574	7,000	12,000	11,062
1917	13	436	600	567	7,000	12,000	11,076
1918	----	----	----	----	----	----	----
1919	----	----	----	----	----	----	----
1920	4	----	600	600	----	13,000	13,000
1921	----	----	----	----	----	----	----
1922	4	450	617	554	8,000	14,000	11,500
1923	8	350	600	562	5,500	12,000	11,000
1924	5	576	612	600	11,000	13,000	12,500
1925	9	566	618	586	8,500	13,000	11,911
1926	3	600	633	611	12,500	15,000	13,333
1927	9	400	638	588	7,200	14,000	11,983
1928 [1]	----	----	----	----	----	----	----
Total	305	----	----	----	----	----	----

[1] No vessels constructed.

The following table describes some of the largest bulk freight carriers on the Great Lakes.

TABLE No. 14

Name	Year built	Length over-all	Length of keel	Beam	Molded depth	Tonnage	
						Measurement gross	Carrying capacity
		Feet	*Feet*	*Feet*	*Feet*		*Gross tons*
Lemoyne [1]	1926	633	621.1	70	33	10,480	15,000
Harry Coulby	1927	630.9	607	65	33	10,179	14,000
Fred G. Hartwell	1922	617	596	64	33	8,889	14,000
Wm. P. Snyder, jr	1912	617	590	64	33	8,603	14,000
Col. James M. Schoonmaker	1911	617	590	64	33	8,603	14,000
L. E. Block	1927	620.9	596	64	33	9,092	13,500
Carl D. Bradley	1927	638	615	65	33	8,805	13,150
Wm. G. Mather	1925	617	592	62	32	8,662	13,000
John A. Topping	1925	617	592	62	32	8,345	13,000
Joseph H. Frantz	1925	617	592	62	32	8,289	13,000
Henry Ford II [2]	1924	608	590	62	32	8,877	13,000
Benson Ford [2]	1924	602	586	62	32	8,626	13,000
Donnacona [1] [3]	1914	625	604	59.2	32	8,611	12,000

[1] Canadian. [2] Diesel motor. [3] Formerly the W. Grant Morden.

Although of the smaller dimensions imposed by the Welland and St. Lawrence Locks, the vessels of the fleet plying in the St. Lawrence River bulk trade between Port Colborne and Montreal are an important factor in the bulk freight trade of the Lakes. Grain from the head of the Lakes destined to Montreal via the Welland Canal is carried over the Lakes to Port Colborne in the large bulk steamers. There it is transferred to these smaller ships, which complete the carriage to destination.

The newer vessels of this class are generally built to an over-all length of 261 feet, having a keel length of 250 to 253 feet, beam averaging about 43 feet, with depths from 15.5 to 22.2 feet. They range in gross tonnage from 1,690 to 2,300 tons and have a carrying capacity of from 2,500 to 3,150 long tons, the majority carrying around 2,800 long tons on 13½ feet draft. Many of these vessels are of steel construction and come across the Atlantic with cargoes for lake ports. While they are limited to a draft of less than 14 feet by the locks of the Welland and St. Lawrence Canals, some of them are capable of loading to a draft of 18 feet or more.

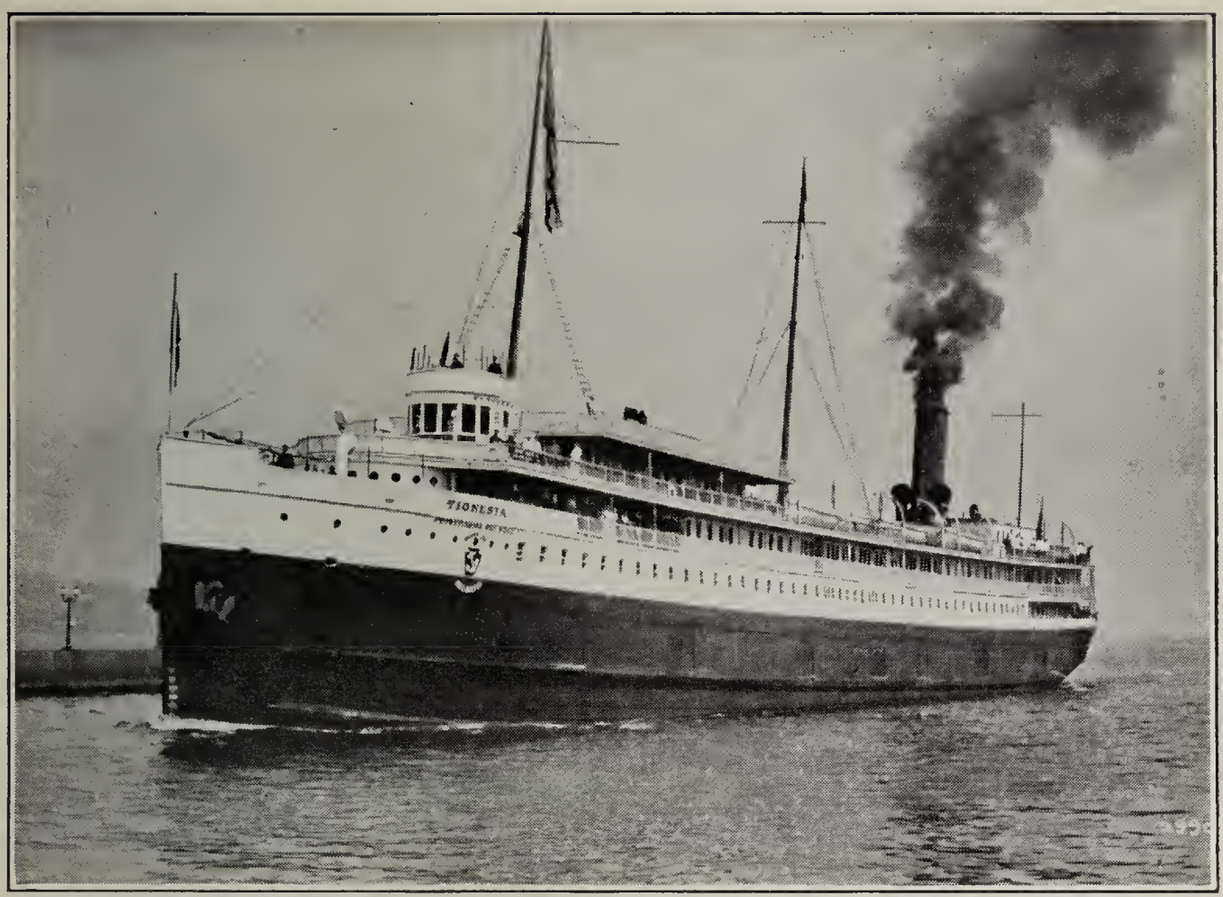
The Canadian Government will probably complete the Welland Ship Canal between Lakes Erie and Ontario during the summer of 1930. It will then be possible for vessels of the largest size to proceed directly to Lake Ontario ports and to the transfer elevators now under construction at Kingston and Prescott, Ontario.

MOTOR SHIPS

Among the 15 motor vessels of 1,000 gross tons and over on the Great Lakes, the two largest were built in 1924 and are owned and operated by the Ford Motor Co. They are the *Henry Ford II* and *Benson Ford*, both Diesel-engine propelled bulk freighters of the standard lake type, measuring 608 and 602 feet, respectively, and having a gross carrying capacity of 13,000 tons.

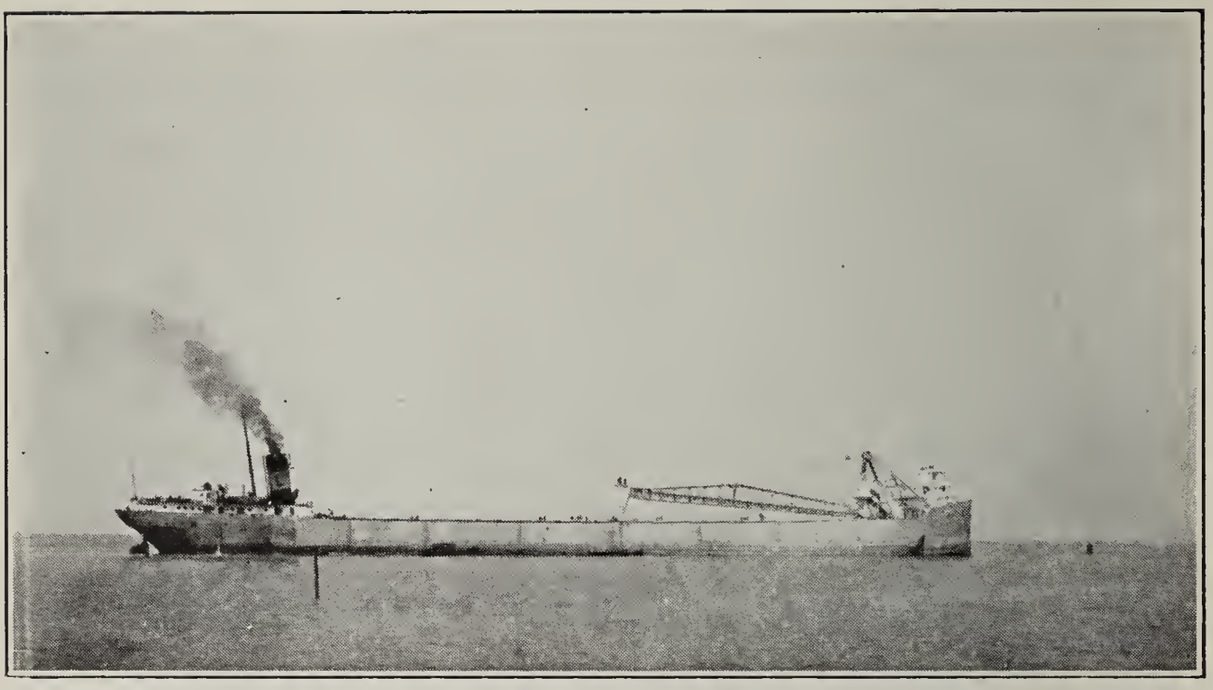
Included in the American registry are 11 bulk freight carriers of from 1,000 to 2,999 gross tons capacity, one of which is a tanker. The Canadian registry includes two bulk freight carriers of 1,000 to 2,999 gross tons.

Two vessels of this type are the sister ships *Steel Motor* and *Steel Vendor* built by the Federal Shipbuilding Co., of Kearney, N. J. They are bulk freighters specially constructed for both lake and coastwise traffic. The ships are 250 feet long, with a beam of 43 feet, a depth of 17 feet, and gross 1,695 tons. Each has a loaded draft of 14 feet for the Welland Canal and 16 feet for coastwise service. A special feature is the equipment of 5-ton cranes located one at each hatch. They are the variable radius, fixed-base revolving type and are capable of handling about 100 tons per hour. All deck machinery, including the handling cranes, are electrically operated.



PASSENGER STEAMER "TIONESTA" OF THE GREAT LAKES TRANSIT CORPORATION
(LENGTH OVER ALL, 316 FEET; BEAM, 45 FEET)

TYPICAL BULK FREIGHT STEAMER UNLOADING COAL AT DULUTH HARBOR



SELF-UNLOADING BULK FREIGHT STEAMER "B. H. TAYLOR" (NORMAL UNLOADING CAPACITY, 2,200 TONS PER HOUR

MOTOR SHIP "HENRY FORD II" UNLOADING COAL AT FORD MOTOR CO.'S DOCK DULUTH, MINN.

New in Great Lakes transportation are the two electrically driven, Diesel-engined vessels, the *Twin Ports* and *Twin Cities*. These were constructed for operation between Duluth and New York via the New York State Barge Canal during the season of navigation and for the Gulf-West Indies trade during the winter months. They have recently been transferred from the Barge Canal to the St. Lawrence River. The vessels measure 251 feet over all, with a beam of 42 feet, a depth of 16 feet, and gross 1,460 tons. A peculiar feature is the control of the engines direct from the bridge without the intermediary of an engineer. In their trials a speed of 9 miles per hour was made on the lakes and 10 miles on the Hudson River. Their holds are equipped for handling grain and package freight in addition to refrigerated space for 600 tons of perishable cargo.

PASSENGER AND PACKAGE-FREIGHT VESSELS

On October 1, 1929, there were 63 steamers of 1,000 gross tons and upward, aggregating 184,048 tons, in the passenger and package freight trade on the Great Lakes. Those of American registry comprised 37 vessels totaling 104,157 gross tons, the remainder being under the Canadian flag. The following table shows by tonnage groups, the construction and typical dimensions of the vessels thus engaged:

TABLE NO. 15.—*Combination freight and passenger vessels of 1,000 gross tons and upward in the Great Lakes fleet, October 1, 1929*

	Number of vessels	Gross tonnage range	Construction		Length between perpendiculars			Beam			Steam propulsion
			Steel	Wood, iron, and composite	Minimum	Maximum	Average	Minimum	Maximum	Average	
American registry	17	1,000–1,999	12	5	201	348	255	35	46	39	17
	9	2,000–2,999	8	1	221	340	267	40	47	43	9
	3	3,000–3,999	3	----	291	350	330	44	48	45	3
	4	4,000–4,999	4	----	340	390	353	45	54	47	4
	2	6,000–6,499	2	----	456	484	470	55	58	57	2
	2	7,500–7,999	2	----	519	519	519	58	58	58	2
Total	37	----	31	6	----	----	----	----	----	----	37
British registry	9	1,000–1,999	8	1	194	308	231	32	41	34	9
	8	2,000–2,999	8	----	206	303	273	36	42	39	8
	4	3,000–3,999	3	1	308	336	323	43	64	49	4
	1	5,000–5,499	1	----	----	341	341	----	50	50	1
	1	5,500–5,999	1	----	----	322	322	----	48	48	1
	1	6,500–6,999	1	----	----	362	362	----	52	52	1
	2	7,000–7,499	2	----	350	350	350	70	70	70	2
Total	26	----	24	2	----	----	----	----	----	----	26
Total, combination freight and passenger	63	----	55	8	----	----	----	----	----	----	63

About half of the vessels listed in Table No. 15 are engaged as package-freight carriers exclusively, having little or no accommodations for passengers. Some of these vessels of both registries occasionally enter the bulk-freight trade, carrying coal to the upper lakes and bringing grain on the return voyage. During the war years these ships carried a large amount of ore to eastern furnaces. This practice is resorted to only during lean periods in the package-freight trade, or when bulk rates become sufficiently attractive to draw them away from their regular traffic. On the other hand, the standard bulk freighter sometimes carries commodities regularly transported in the packet steamers. This occurs less frequently and is mostly confined to the automobile trade. Bulk freighters have taken full cargoes of automobiles from Detroit, stowing them in the hold and carrying a full deck load.

Passenger vessels, however, operate on fixed schedules between regular ports of call. Their sailings are not interrupted by changes occurring in rates or charter markets.

The steamers *Greater Detroit* and *Greater Buffalo* of the Detroit & Cleveland Navigation Co., the largest passenger vessels on the Lakes, were launched at Lorain, Ohio, late in 1923 for service between Buffalo and Detroit. They are side-wheelers, the first lake passenger vessels so constructed since 1913. A feature of their design is the inclusion of an additional rudder molded into the bow, which permits of easier navigation in narrow channels. They are the largest ships in the world equipped with double rudders. Both are 550 feet long over all, 100 feet wide over wheel guards, have a molded depth of 23 feet 6 inches, and are capable of a speed of 21 miles per hour. They are luxuriously fitted and have 650 rooms with bed or berth accommodations for 1,200 passengers, comparing favorably with the largest ocean liners.

In addition to the Detroit & Cleveland Navigation Co., through passenger and freight service, either over their own lines or by connections, is maintained throughout the navigation season by the Chicago, Duluth & Georgian Bay Transit Co., the Canada Steamship Lines, the Canadian Pacific Railway Steamship Lines, the Cleveland & Buffalo Transit Co., the Northern Navigation Co. (Ltd.), the Great Lakes Transit Corp., and others. Those engaged principally in the freight trade are the Rutland-Lake Michigan Transit Co., the Minnesota-Atlantic Transit Co., the Canada Atlantic Transit Co., the Nicholson Universal Steamship Co., and others. For routes and ports of call of the principal package-freight lines, see maps at page 408.

IV. COMMERCE

COMMERCE OF THE PRINCIPAL PORTS

The commerce of the Great Lakes has steadily increased since 1925, ranging from 130,148,397 short tons in that year to 149,706,670 tons in 1928. During the previous five years the tonnage fluctuated so that the greatest movement occurred in 1923, with 125,517,551 tons and the least in 1921, when 71,460,170 tons were reported.

Duluth-Superior led in the tonnage handled, with a maximum of 59,274,812 tons in 1923 and a minimum of 30,083,555 tons in 1921, the average being 47,363,000 tons for the last 10 years. This preponderance over other ports is mainly due to the shipment of iron ore from Duluth-Superior. The next port of importance is Buffalo, with a maximum tonnage of 21,005,518 in 1928 and an average of 17,924,000 tons during the last 10 years. The third port is Chicago, including Calumet, whose combined tonnage averaged 12,987,000 tons in the last decade. Other ports, in the order of average tonnages for the last 10 years, are Ashtabula, Toldeo, Cleveland, Conneaut, Calcite, Ashland, Milwaukee, Agate Bay, Lorain, Escanaba, Detroit, including the traffic of Rouge River, Sandusky, Gary, Indiana Harbor, Fairport, Erie, and Ludington.

Segregating the tonnages by lakes, it is found that in 1928 about 40 per cent of the entire tonnage of the five lakes was received and shipped at Lake Erie ports. Lake Superior followed with 32 per cent, Lake Michigan with 22 percent, Lake Huron with 5 per cent, and Lake Ontario with 1 per cent.

The commerce of the United States ports on Niagara and St. Lawrence Rivers amounted to 2,226,483 tons in 1928, and the traffic of the ports on the connecting channels, such as St. Clair and Detroit Rivers, amounted to 11,109,539 tons.

The following table gives the traffic in short tons of the United States ports on the Great Lakes system for the calendar years 1913 and 1919 to 1928, inclusive. In this compilation all localities have been included for which statistics have been compiled for these years. The data in this report differ from those shown in the previous volume as car-ferry traffic at certain ports has been included. This form of traffic utilizes the facilities at the ports; and because of its nature, the vessels employed required the maximum depths of water.

In addition to the individual port figures, there are also given the gross totals by lakes and the rivers and connecting channels comprising the Great Lakes system, as well as the gross tonnages for the system and the corresponding net or final tonnages after all known duplications have been eliminated.

TABLE NO. 16.—*Commerce of the ports on the Great Lakes system for the calendar years 1913 and 1919–1928, inclusive*

[Traffic in tons of 2,000 pounds]

Ports	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE SUPERIOR											
Grand Portage, Minn	(1)	(1)	6,652	5,773	113	212	348	405	197	395	228
Grand Marais, Minn	5,480	8,468	14,447	7,500	118,234	83,297	75,451	167,739	94,557	71,354	74,768
Beaver Bay, Minn	(1)	(1)	(1)	(1)	(1)	3,578	625	(1)	(1)	(1)	(1)
Agate Bay, Minn	11,758,009	7,474,418	10,704,464	3,980,097	6,851,193	7,490,612	5,646,160	6,943,495	7,277,017	6,604,185	6,605,491
Duluth-Superior, Minn. and Wis	46,875,416	42,895,681	46,808,613	30,083,555	38,202,074	59,274,812	45,416,956	51,334,641	53,695,305	52,712,269	53,204,335
Port Wing, Wis	11,712	2,978	2,310	893	1,327	675	2,950	244	161	(1)	(1)
Cornucopia, Wis	(1)	(1)	1,146	594	587	387	712	199	51	200	100
Bayfield, Wis	(1)	(1)	6,700	5,100	10,898	17,585	15,909	(1)	(1)	1,025	1,050
Washburn, Wis	(1)	(1)	82,230	94,964	39,077	128,251	106,189	157,853	45,198	149,402	62,957
Ashland, Wis	5,623,309	7,346,243	9,836,329	3,183,453	7,064,184	7,730,076	6,158,993	8,215,552	8,757,791	7,921,942	7,993,033
Ontonagon, Mich	8,525	3,069	2,950	1,080	600	1,850	21,700	24,789	28,715	40,442	25,335
Keweenaw Waterway, Mich. (ports on)	1,060,247	932,268	792,424	655,265	657,955	1,062,460	660,491	661,677	877,118	1,022,485	773,196
Baraga, Mich	(1)	(1)	3,240	4,379	4,899	3,100	3,487	2,135	3,248	2,775	1,787
L'Anse, Mich	(1)	(1)	1,016	4,560	1,605	(1)	74,734	103,534	76,382	55,743	52,359
Pequaming, Mich	(1)	(1)	26,582	14,106	31,385	26,120	17,341	94,688	51,638	15,095	8,925
Marquette Bay, Mich	2,406,762	1,681,668	3,042,433	658,788	1,805,270	2,181,402	1,645,145	2,517,185	2,819,537	2,719,551	2,978,582
Marquette, Mich	1,852,229	997,126	1,138,165	426,829	655,370	1,293,239	1,419,693	1,692,554	1,259,060	1,132,421	1,059,167
Munising, Mich	(1)	(1)	1,221	4,396	3,448	13,290	4,380	8,705	40,832	66,035	76,985
Grand Marais, Mich	333	1,030	315	40	75	29	615	740	1,845	1,446	1,929
Shelldrake, Mich	(1)	(1)	21,354	6,257	18,604	15,490	14,061	(1)	(1)	(1)	(1)
Sault Ste. Marie, Mich	(1)	(1)	163,821	214,921	821,892	855,726	688,257	760,926	764,269	808,605	838,122
Total, Lake Superior	69,602,022	61,342,949	72,656,412	39,352,550	56,288,790	80,182,110	61,974,206	72,687,061	75,792,921	73,325,370	73,758,349
LAKE MICHIGAN											
Manistique, Mich	254,413	382,418	306,280	249,145	278,349	327,845	323,582	307,777	266,400	268,948	249,079
Gladstone, Mich	(1)	(1)	107,100	75,990	90,725	97,946	84,310	81,759	94,616	109,395	91,788
Escanaba, Mich	(1)	5,558,961	7,608,777	2,270,860	5,386,885	6,559,896	5,047,875	6,800,631	7,671,066	6,784,985	6,306,483
Menominee, Mich. and Wis	470,200	434,631	415,734	472,770	593,941	762,122	717,045	748,455	822,468	756,361	789,719
Oconto, Wis	312	1,932	1,470	755	368	620	398	248	250	275	300
Green Bay, Wis., including De Pere	909,600	987,742	1,141,400	1,151,252	862,306	1,405,696	1,226,565	1,423,971	1,556,734	1,768,654	1,626,463
Sturgeon Bay, Wis	(1)	124,142	(1)	189,360	191,100	217,955	241,212	350,558	400,628	395,259	496,251
Algoma, Wis	10,414	1,884	332	1,055	1,648	1,584	1,569	1,996	1,326	3,644	5,364
Kewaunee, Wis	172,116	183,903	272,534	192,202	235,492	303,516	357,910	398,927	337,144	332,678	480,906
Two Rivers, Wis	27,283	23,961	19,852	27,160	9,182	23,867	27,725	22,896	27,096	40,306	26,439
Manitowoc, Wis	1,901,065	1,771,370	1,760,755	1,616,332	1,672,658	2,072,942	2,017,436	2,205,315	2,155,271	2,268,475	2,319,778
Sheboygan, Wis	761,971	552,026	484,335	436,903	476,504	431,953	423,302	396,074	469,001	476,030	448,226
Port Washington, Wis	12,677	615	507	482	2,904	10,519	20,609	17,881	17,687	19,665	18,512
Milwaukee, Wis	8,647,230	7,008,200	5,760,569	6,431,147	5,602,935	7,705,041	6,476,414	6,907,811	7,537,516	8,233,198	7,984,794
Racine, Wis	247,737	233,804	204,680	242,551	246,032	271,278	261,878	232,847	249,029	256,776	281,505

Kenosha, Wis	85,743	38,537	35,232	25,589	24,869	43,916	48,104	97,368	63,710	85,871	52,621
Waukegan, Ill	235,376	177,788	87,740	141,700	96,413	120,367	84,443	94,252	97,771	67,001	267,290
Chicago, Ill., including Calumet	13,275,320	10,206,162	11,919,755	8,848,332	12,537,676	13,899,044	11,119,656	14,425,790	15,014,846	14,095,519	17,808,925
Indian Harbor, Ind	875,306	2,752,105	3,146,159	2,395,962	2,890,558	4,140,725	4,195,436	5,287,760	5,881,043	5,787,919	6,793,637
Buffington, Ind	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,380,688	1,682,820
Gary, Ind	(1)	2,810,458	4,095 525	2,632,650	3,241,780	4,460,020	3,464,638	6,760,000	5,967,048	5,396,985	7,231,643
Michigan City, Ind	21,398	7,710	13,126	5.165	1,715	4,482	5,747	24,970	2,515	327	147
St. Joseph, Mich	84,795	98,945	128,240	78,847	130,385	146,499	97,471	65,414	77,510	36,211	28,245
South Haven, Mich	24,563	22,499	14,955	21,179	23,838	15,449	17,008	12,399	15,970	16,766	21,629
Saugatuck, Mich	7,850	3,200	4,312	4,513	16,205	12,985	11,758	2,214	158	12	1,455
Holland, Mich	38,344	46,091	28,025	20,946	54,551	86,388	87,497	50,661	47,694	60,426	41,583
Grand Haven, Mich	649,130	715,578	749,240	632,371	688,179	906,940	789,571	953,658	971,073	1,238,902	1,373,903
Muskegon, Mich	110,773	146,833	174,500	309,938	382,733	424,736	356,986	389,132	339,796	432,268	639,028
White Lake, Mich	11,078	503	313	1,840	17,934	17,913	13,860	3,915	9,123	27,000	1,156
Penwater, Mich	3,527	16	989	1,227	788	529	223	510	5	7	11
Ludington, Mich	1,636,864	2,288,873	2,076,020	1,830.263	2,029.164	2.734,119	2,472,463	2,533,519	2,440,277	2,417,385	2,582,346
Manistee, Mich	306,898	45,722	35,190	40,944	42,395	39,404	46,337	66,849	65,538	59,389	90,818
Portage, Lake, Mich	2,184	2,466	1,636	1,826	2,497	2,373	2,829	1,616	406	(1)	726
Arcadia, Mich	22,626	494	269	36	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Frankfort, Mich	764,459	1,397,606	1,432,531	1,131,509	1,363,714	1,553,320	1,507,674	1,649,912	1,629,914	1,567,012	1,651,083
Traverse City, Mich	(1)	(1)	7,475	18,830	21,408	12,750	16,063	18,614	11,543	10,282	9,304
Charlevoix, Mich	198,160	110,660	62,850	18,953	42,181	66,449	47,986	24,882	47,606	46,992	14,562
Petoskay, Mich	2,835	1,559	1,291	1,574	4,756	3,670	1,572	2,223	7,996	9,340	5,419
Petoskay Portland Cement Co	(1)	(1)	(1)	(1)	(1)	69,927	97,512	85,404	123,599	123,785	151,741
Total, Lake Michigan	31,822,247	38,139,394	42,099,698	31,522,158	39,264,768	48,954,785	41,712,664	52,448,208	54,471,373	54,574,736	61,575,699
LAKE HURON											
Mackinac, Mich	24,959	16,000	11,179	8,382	8,350	6,204	9,200	11,225	8,255	10,038	10,940
Cheboygan, Mich	210,672	100,775	70,197	19,210	17,880	24,124	38,141	36,340	33,802	37,634	11,637
Calcite, Mich. (Rogers City)	1,263,660	4,504,270	6,544,614	3,503,260	5,968,510	7,667,362	6,899,021	8,505,960	9,107,879	10,457,173	11,274,360
Rockport, Mich	(1)	(1)	(1)	(1)	(1)	955,067	1,207,618	1,427,237	1,873,858	1,774,903	2,001,523
Alpena, Mich	938,217	913,351	1,120,989	627,740	1,008,629	985,340	1,162,776	1,394,810	1,600,604	1,561,481	1,824,132
Saginaw, Mich	177,829	73,119	98,905	54,254	85,827	156,960	307,976	318,213	391,869	444,020	400,702
Port Crescent, Mich	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	375,125	472,436
Harbor Beach, Mich	11,297	23,156	21,716	18,272	14,429	22,410	23,511	26,244	29,350	19,600	46,865
Total, Lake Huron	2,626,634	5,630,671	7,867,600	4,231,118	7,103,625	9,817,467	9,648,243	11,720,029	13,045,617	14,679,974	16,042,595
LAKE ERIE											
Monroe, Mich	2,155	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Toledo, Ohio	7,510,634	10,130,014	10,904,293	9,202,109	9,424,518	11,987,355	11,320,476	16,304,042	16,479,545	8,926,246	18,539,995
Port Clinton, Ohio	6,413	5,577	16,934	5,893	13,441	12,253	12,248	15,488	4,819	5,114	5,971
Marblehead, Ohio	(1)	(1)	(1)	16,415	69,312	32,507	29,771	31,830	24,288	78,979	89,202
Sandusky, Ohio	3,253,954	2,069,066	2,277,489	2,427,220	3,496,624	3,896,748	4,812,504	6,714,652	7,660,890	8,581,895	7,611,278
Huron, Ohio	2,557,932	2,826,314	3,584,355	2,214,631	1,114,569	2,795,939	1,630,660	1,912,409	1,971,448	1,579,616	1,901,333
Vermilion, Ohio	748	597	517	6,414	7,505	2,019	2,154	773	513	496	507
Lorain, Ohio	8,609,897	6,817,729	8,519,316	4,941,882	5,498,656	8,279,209	6,144,892	6,839,730	6,910,857	7,444,732	6,793,306
Cleveland, Ohio	16,488,083	12,335,283	12,463,028	6,200,362	10,925,692	14,455,878	10,584,040	12,092,330	12,986,469	12,168,763	13,457,218

[1] No record.

TABLE NO. 16.—*Commerce of the ports on the Great Lakes system for the calendar years 1913 and 1919–1928, inclusive*—Continued

[Traffic in tons of 2,000 pounds]

Ports	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE ERIE—continued											
Fairport, Ohio	3,156,842	2,588,354	1,963,501	1,945,310	1,953,608	4,162,844	3,395,639	4,327,276	4,194,934	4,843,945	5,655,994
Ashtabula, Ohio	15,743,375	13,867,930	17,120,338	6,396,667	12,393,847	18,324,547	10,135,250	10,659,840	12,444,819	11,004,218	11,315,272
Conneaut, Ohio	10,783,204	10,047,535	9,685,893	7,806,904	9,352,175	13,619,718	10,184,903	11,388,873	12,800,303	9,716,747	11,427,126
Put in Bay, Ohio	(1)	(1)	(1)	10,735	14,490	9,865	10,342	8,988	4,457	3,331	3,393
Kelleys Island, Ohio	(1)	(1)	(1)	20,711	454,089	591,771	384,612	533,474	254,212	495,538	293,001
North Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	1,493	617	587	583	416
Middle Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	2,304	1,861	1,924	1,799	1,226
Erie, Pa	3,340,071	3,197,794	4,252,100	2,325,067	2,212,348	3,766,389	2,527,361	1,695,742	3,045,580	2,860,772	2,352,770
Dunkirk, N. Y	(1)	1,503	3,238	1,673	4,760	17,334	18,398	9,751	14,497	24,440	26,526
Buffalo, N. Y. (by lake)	18,920,854	14,610,551	18,094,623	14,033,351	17,679,096	18,819,063	19,710,035	18,832,952	17,062,698	19,397,150	21,005,518
Buffalo, N. Y. (by canal)	1,272,015	583,197	579,719	718,833	867,792	915,847	942,091	1,539,900	1,390,932	1,390,788	1,772,311
Total, Lake Erie	91,646,177	79,081,444	89,465,344	58,274,177	75,482,432	88,689,336	81,849,173	92,910,528	97,253,772	88,444,152	102,252,363
LAKE ONTARIO											
Charlotte, N. Y	1,431,914	835,461	1,576,148	575,929	633,470	1,044,061	1,195,861	731,313	1,115,020	1,050,591	1,521,318
Great Sodus, N. Y	65,137	165,772	19,636	160,612	118,835	106,705	107,834	266,810	252,788	202,430	565,660
Little Sodus, N. Y	116,819	92,719	132,625	81,534	34,305	111,135	49,070	86,553	82,710	43,991	15,958
Oswego, N. Y. (by lake)	825,981	463,749	453,734	358,193	224,548	394,202	247,782	235,483	180,074	204,594	181,556
Oswego, N. Y. (by canal)	(1)	7,516	5,027	18,946	(1)	15,525	64,827	95,356	91,451	142,948	211,756
Sacket Harbor, N. Y	(1)	(1)	(1)	(1)	(1)	(1)	30,774	19,187	7,566	9,258	14,889
Total, Lake Ontario	2,439,851	1,565,217	2,187,170	1,195,214	1,011,158	1,671,628	1,696,148	1,434,702	1,729,609	1,653,812	2,511,137
Grand total, Great Lakes	198,136,931	185,759,675	218,276,224	134,575,217	179,150,773	242,315,326	196,880,434	230,750,528	242,293,292	232,678,044	256,140,143
NIAGARA RIVER											
Tonawanda, N. Y. (by lake and river)	1,179,510	578,278	1,583,154	1,050,519	163,881	144,678	353,991	504,752	452,968	557,483	437,692
Niagara River, N. Y	201,554	139,500	122,423	152,144	221,999	198,937	151,939	178,553	152,601	178,217	163,933
Lewiston, N. Y	(1)	(1)	(1)	44	77	66	80	46	339	775	830
Total, Niagara River	1,381,064	717,778	1,705,577	1,202,707	385,957	343,681	506,010	683,351	605,908	736,475	602,455
ST. LAWRENCE RIVER											
Cape Vincent, N. Y	5,715	3,094	3,121	3,058	4,387	5,092	4,741	3,705	5,779	7,622	4,480
Clayton, N. Y	(1)	(1)	2,284	2,092	915	542	2,264	4,381	8,595	537	5,339
Morristown, N. Y	(1)	(1)	1,570	1,315	575	3,107	3,116	8,865	7,609	7,569	3,365
Ogdensburg, N. Y	1,002,722	709,978	977,103	927,760	1,121,852	1,548,715	1,449,174	1,566,601	1,375,802	1,536,848	1,458,506

Waddington, N. Y.	(1)	(1)	66,742	(1)	22,978	43,912	69,178	140,343	139,718	119,786	137,365
Alexandria Bay, N. Y.	(1)	(1)	6,304	6,312	9,752	11,365	10,800	12,681	12,294	14,505	14,973
Total, St. Lawrence River	1,008,437	713,072	1,057,124	940,537	1,160,459	1,612,733	1,539,273	1,736,576	1,549,797	1,686,867	1,624,028
CONNECTING CHANNELS (PORTS ON)											
Port Huron, Mich. (Black and St. Clair Rivers)	[2] 105,191	273,231	274,914	255,416	328,534	337,953	436,778	677,671	925,152	1,031,341	1,040,940
Detroit, Mich.	(1)	(1)	1,665,159	1,476,289	2,305,678	3,206,267	2,972,266	4,216,159	4,320,592	4,210,983	3,985,514
Rouge River, Mich.	1,684,742	996,825	1,632,024	842,359	1,136,823	1,458,831	2,092,662	3,009,730	3,199,528	3,368,887	4,595,335
Wyandotte, Mich.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,029,208	1,159,053	937,348	1,487,750
Clinton River, Mich.	22,683	15,342	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Total, connecting channels	1,812,616	1,285,398	3,572,097	2,574,064	3,771,035	5,003,051	5,501,706	8,932,768	9,604,325	9,548,559	11,109,539
Gross total, lakes, rivers, and connecting channels	202,339,048	188,475,923	224,615,022	139,292,525	184,468,224	249,274,791	204,427,423	242,103,223	254,053,322	244,649,945	269,476,165
Grand net total after eliminating duplications	[3]	89,428,503	111,139,686	71,460,170	94,038,090	125,517,551	109,831,279	130,148,397	137,394,434	140,360,791	149,706,670

[1] No record.

[2] Black River traffic only.

[3] Not ascertained.

TABLE NO. 17.—*Commerce of the ports on the Great Lakes during the calendar year 1928*

[Quantities expressed in short tons]

Grand divisions and localities	Foreign				Domestic						Total	
	Imports		Exports		Coastwise receipts		Coastwise shipments		Other domestic			
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
GREAT LAKES												
Grand Marais, Minn					3,756	$131,572	71,012	$143,712			74,768	$275,284
Agate Bay, Minn					173,937	1,096,963	6,431,554	19,897,684			6,605,491	20,994,647
Duluth-Superior, Minn. and Wis	57,535	$747,955	2,195,265	$61,069,432	11,675,599	121,589,229	39,275,936	297,694,907			53,204,335	481,101,523
Ashland, Wis	120,000	660,000	187,767	580,200	614,136	2,751,384	7,071,130	21,849,792			7,993,033	25,841,376
Cornucopia, Wis							100	12,000			100	12,000
Washburn, Wis	5,892	330,404			56,890	305,882	175	52,500			62,957	688.786
Oconto, Wis									300	$24,000	300	24,000
Green Bay, Wis. (including Depere)	11,306	185,700			1,336,470	25,619,950	277,687	2,555,700	1,000	100,000	1,626,463	28,461,350
Sturgeon Bay, Wis					23,443	551,000	472,558	570,100	250	80,000	496,251	1,201,100
Algoma, Wis					5,195	33,550			169	54,000	5,364	87,550
Kewaunee, Wis					227,217	51,703,150	253,598	32,452,300	91	24,300	480,906	84,179,750
Two Rivers, Wis					25,777	113,250			662	159,250	26,439	272,500
Manitowoc, Wis	4,300	142,900			1,485,489	73,466,690	829,948	91,025,200	41	5,360	2,319,778	164,640,150
Sheboygan, Wis	4,325	31,350			433,203	5,058,600	10,456	2,352,600	242	89,550	448,226	7,532,100
Port Washington, Wis					17,938	90,600			574	218,250	18,512	308,850
Milwaukee, Wis	14,134	882,950	28,200	3,458,900	6,183,059	223,078,700	1,759,081	286,883,100	320	96,000	7,984,794	514,399,650
Racine, Wis					270,323	3,668,850	11,077	3,350,550	105	33,600	281,505	7,053,000
Kenosha, Wis					34,043	4,133,820	18,258	15,846,900	320	88,380	52,621	20,069,100
Menominee, Mich. and Wis	7,154	402,900			527,053	19,086,100	247,262	34,190,100	8,250	69,300	789,719	53,748,400
Bayfield, Wis					1,050	105,000					1,050	105,000
Munising, Mich	23,842	155,490			53,143	210,446					76,985	365,936
Pequaming, Mich							8,925	175,525			8,925	175,525
Grand Portage, Minn					60	3,996	168	13,440			228	17,436
Baraga, Mich							1,787	25,894			1,787	25,894
L'Anse, Mich					28,717	113,719	23,642	474,779			52,359	588,498
Manistique, Mich					80,762	4,543,550	168,108	25,920,000	209	119,150	249,079	30,582,700
Ontonagon, Mich					25,335	184,061					25,335	184,061
Keweenaw Waterway, Mich. (ports on)	4,750	72,295	9,533	1,676,436	698,280	5,758,635	60,633	12,306,234			773,196	19,813,600
Marquette Bay, Mich			362,531	1,120,221			2,616,051	8,262,274			2,978,582	9,382,495
Marquette Harbor, Mich			74,025	228,737	206,873	819,217	778,269	2,459,845			1,059,167	3,507,799
Grand Marais Harbor of Refuge, Mich					1,854	161,928	75	1,475			1,929	163,403
St. Joseph, Mich					11,588	2,079,900	16,553	2,280,100	104	27,100	28,245	4,387,100
South Haven, Mich	9,376	228,600			7,009	656,850	5,126	1,241,750	118	66,300	21,629	2,193,500

Saugatuck, Mich					1,377	48,700	55	3,600	23	11,300	1,455	63,600
Holland, Mich	1,579	63,000			18,350	2,488,000	21,654	6,962,000			41,583	9,513,000
Grand Haven, Mich					626,730	153,940,750	742,298	93,940,000	4,875	34,950	1,373,903	247,915,700
Muskegon, Mich	61,067	339,300			425,251	16,172,000	152,671	12,214,650	39	18,750	639,028	28,744,700
White Lake, Mich					1,125	20,250	10	2,250	21	11,900	1,156	34,400
Ludington, Mich					1,074,868	114,784,100	1,507,036	95,598,600	442	31,500	2,582,346	210,414,200
Manistee, Mich	3,935	21,000			82,139	1,094,450	4,654	667,950	90	42,600	90,818	1,826,000
Frankfort, Mich					874,076	127,901,180	776,805	100,363,370	202	112,450	1,651,083	228,377,000
Charlevoix, Mich					13,773	331,450	676	126,000	113	43,650	14,562	501,100
Pentwater, Mich									11	4,800	11	4,800
Traverse City, Mich					7,284	217,200	1,951	355,850	69	24,650	9,304	597,700
Gladstone, Mich	1,422	65,400			90,049	6,816,600	252	4,950	65	18,000	91,788	6,904,950
Petoskey Portland Cement Harbor, Mich					100,294	461,350	51,447	540,200			151,741	1,001,550
Escanaba, Mich			347,067	1,072,500	195,559	971,050	5,763,789	17,943,100	68	24,850	6,306,483	20,011,500
Port of Sault Ste. Marie, Mich					833,850	3,964,925	4,272	126,510			838,122	4,091,435
Portage Lake Harbor, Mich					490	22,000	236	15,350			726	37,350
Mackinac, Mich					9,830	902,280	1,110	222,000			10,940	1,124,280
Cheboygan, Mich	3,267	490,050			7,345	121,990	1,025	128,125			11,637	740,165
Calcite, Mich			49,032	34,322	137,857	585,892	11,087,471	7,761,230			11,274,360	8,381,444
Alpena, Mich. (including Bayshore)					246,586	1,236,434	1,577,546	7,973,758			1,824,132	9,210,192
Saginaw River, Mich. (ports on)	15,044	231,778			329,343	2,810,226	56,315	506,835			400,702	3,548,839
Harbor Beach, Mich					46,865	152,559					46,865	152,559
Port Huron, Mich. (Black and St. Clair Rivers)	58,509	561,128	1,920	144,000	924,727	22,033,258	55,784	3,803,990			1,040,940	26,542,376
Detroit, Mich	265,565	6,750,892	193,617	5,463,425	3,044,385	71,551,873	481,947	206,048,425			3,985,514	289,814,615
Rouge River, Mich	197,248	898,406	40,167	2,058,168	4,280,648	35,117,817	77,272	541,454			4,595,335	38,615,845
Wyandotte, Mich	87,913	87,913	10,726	53,630	1,389,111	2,355,601					1,487,750	2,497,144
Rockport, Mich					16,021	68,090	1,985,502	1,171,301			2,001,523	1,239,391
Port Crescent, Mich			23,765	19,012			448,671	358,937			472,436	377,949
Mackinaw City and St. Ignace, Mich.[1]												
Chicago, Ill. (including Chicago Harbor, Chicago River, Calumet Harbor)	223,999	7,993,035	178,674	7,090,903	14,318,009	156,856,297	1,218,885	76,731,229	1,869,358	4,564,761	17,808,925	253,236,225
Buffington, Ind					1,682,820	1,077,205					1,682,820	1,077,205
Gary, Ind			16,044	572,860	7,215,599	23,861,590					7,231,643	24,434,405
Indiana Harbor, Ind	3,500	102,500	29,308	997,242	5,645,598	20,216,905	1,061,627	31,047,057	53,244	32,054	6,707,225	52,395,759
Michigan City, Ind									147	51,450	147	51,450
Waukegan, Ill					266,998	1,043,386			292	87,600	267,290	1,130,986
Toledo, Ohio	115,514	4,410,813	2,069,345	8,239,146	2,629,655	17,589,345	13,725,481	63,486,002			18,539,995	93,725,306
Put in Bay, Ohio					2,614	147,851	779	91,822			3,393	239,673
Marblehead, Ohio					4,658	5,590	84,544	67,635			89,202	73,225
Kelleys Island, Ohio					12,229	141,106	280,772	282,855			293,001	423,961
Port Clinton, Ohio					5,871	236,445	100	3,000			5,971	239,445
North Bass Island, Ohio					303	22,664	113	12,204			416	34,868
Middle Bass Island, Ohio					618	34,366	608	136,843			1,226	171,209
Sandusky, Ohio[2]	103,586	151,885	1,159,180	4,260,340	1,264	284,400	5,985,484	21,117,223	361,764	609,050	7,611,278	26,422,898
Huron, Ohio			98,631	356,058	1,140,500	4,480,673	655,521	2,366,431	6,681	108,995	1,901,333	7,312,157
Vermillion, Ohio									507	76,050	507	76,050
Lorain, Ohio			384,758	3,257,493	4,421,405	16,092,396	1,777,939	6,418,360	209,204	255,283	6,793,306	26,023,532
Cleveland, Ohio	204,829	3,045,665	199,672	1,252,632	11,700,288	153,711,866	1,163,292	52,285,823	189,137	247,949	13,457,218	210,543,935
Fairport, Ohio	312,562	11,061,594	1,323,960	14,250,228	3,211,139	12,093,059	807,543	4,747,696	790	134,300	5,655,994	42,286,877

TABLE NO. 17.—*Commerce of the ports on the Great Lakes during the calendar year 1928*—Continued

[Quanties expressed in short tons]

Grand divisions and localities	Foreign				Domestic						Total	
	Imports		Exports		Coastwise receipts		Coastwise shipments		Other domestic			
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
GREAT LAKES—continued												
Ashtabula, Ohio	86,060	$6,144,045	1,374,832	$21,781,440	7,013,655	$27,703,937	2,838,590	$11,688,919	2,135	$362,950	11,315,272	$67,681,291
Conneaut, Ohio [3]			114,820	414,500	9,282,891	36,662,007	1,730,115	6,245,715			11,127,826	43,322,222
Erie, Pa	395,458	10,005,629	112,692	1,174,649	914,421	9,516,273	760,868	15,737,728	169,331	367,881	2,352,770	36,802,160
Dunkirk, N. Y	3,044	16,986			14,710	14,710			8,772	21,323	26,526	53,019
Buffalo, N. Y.:												
By lake	5,425,998	203,457,977	2,088,599	75,712,739	10,786,696	261,361,857	1,246,498	91,055,976	1,457,727	728,863	21,005,518	632,317,412
By New York Barge Canal									1,772,311	71,346,377	1,772,311	71,346,377
Tonawanda, N. Y. (by lake and Niagara River)	43,018	317,579			274,208	1,268,846	1,578	42,606	118,888	59,444	437,692	1,688,475
Charlotte, N. Y. (Rochester)	174,386	2,202,179	1,129,399	7,771,897			189,533	846,130	28,000	22,400	1,521,318	10,842,606
Great Sodus Bay, N. Y			553,248	2,238,830			12,412	49,869			565,660	2,288,699
Little Sodus Bay, N. Y			9,352	97,261			6,606	8,390			15,958	105,651
Oswego, N. Y.:												
By lake	458	2,750	115,550	2,568,329	7,050	809,375	58,258	5,170,271	240	33,600	181,556	8,584,325
By New York Barge Canal									211,756	16,346,046	211,756	16,346,046
Morristown, N. Y	3,154	659,847	211	68,125							3,365	727,972
Sackets Harbor, N. Y					14,889	402,003					14,889	402,003
Cape Vincent, N. Y	4,226	206,734	254	22,051							4,480	228,785
Ogdensburg, N. Y	351,114	61,799,420	895,315	9,255,820	212,077	1,601,800					1,458,506	72,657,040
Clayton, N. Y	706	51,627	168	11,116	4,465	130,912					5,339	193,655
Alexandria Bay, N. Y	932	14,270	241	11,802	5,300	48,775	8,500	62,500			14,973	137,347
Waddington, N. Y	137,361	858,918	4	900							137,365	859,818
Lewiston, N. Y	41	33,634	789	477,531							830	511,165
Gross total, Great Lakes ports	8,548,109	325,886,498	15,378,661	238,862,875	119,776,422	1,860,702,256	118,825,264	1,809,121,180	6,479,057	97,090,316	269,007,513	4,331,663,125
Net total after eliminating all known duplications											149,705,670	2,496,751,407

[1] Traffic consists of 103,633 tons carried by general ferry.
[2] Exclusive of 6,219 tons of general ferry traffic.
[3] Exclusive of 299,300 tons of car ferry traffic.

VALUE OF THE COMMERCE ON THE GREAT LAKES

Table No. 18 gives the value of the traffic of the United States ports on the Great Lakes system for the calendar years 1913 and 1919 to 1928, inclusive. In this compilation all localities have been included for which statistics have been compiled for these years. The data given in this report differ from those previously published in that they include the value of the car ferry traffic at ports where such is found.

The net value of the traffic on the Great Lakes system, after eliminating all known duplications, reached its peak in 1928 when it was $2,496,751,407, or more than twice the value in 1919. In 1921 the value was $957,770,428, the only year when it dropped below the billion dollar mark in the last 10 years. Since 1925 the total net value has exceeded $2,000,000,000.

Segregated by lakes, it is found that in the value of the traffic, Lake Michigan leads by a large margin, but this is due to the inclusion of the valuable car ferry traffic found on this lake, as well as a preponderance of higher priced commodities. In value, the Lake Erie commerce ranks second, followed by Lake Superior, Lake Ontario, and Lake Huron.

In 1928 the leading port as to value of commerce was Buffalo, with a traffic by lake amounting to $632,317,412, and next in order were Milwaukee, Duluth-Superior, Detroit, Chicago, and Grand Haven.

TABLE NO. 18.—*Commerce of the ports on the Great Lakes system for the calendar years 1913 and 1919 to 1928, inclusive, value of traffic*

	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE SUPERIOR											
Grand Portage, Minn	(1)	(1)	$66,806	$56,681	$10,295	$16,838	$18,932	$25,637	$27,290	$37,027	$17,436
Grand Marais, Minn	$199,648	$371,802	292,351	326,094	488,300	347,408	305,614	724,438	868,874	416,829	275,284
Beaver Bay, Minn	(1)	(1)	(1)	(1)	(1)	87,006	24,544	(1)	(1)	(1)	(1)
Agate Bay, Minn	31,758,689	31,090,565	48,943,259	14,939,602	24,860,712	32,573,621	20,873,432	22,133,472	23,746,545	20,751,057	20,994,647
Duluth-Superior, Minn. and Wis	352,595,577	444,037,628	552,900,033	330,512,891	365,660,138	449,701,954	516,837,517	471,675,972	424,243,329	520,640,087	481,101,523
Port Wing, Wis	192,516	183,553	185,045	96,435	72,949	49,433	68,629	34,020	12,511	(1)	(1)
Cornucopia, Wis	(1)	(1)	107,549	39,965	45,565	29,373	41,671	13,908	3,729	20,000	12,000
Bayfield, Wis	(1)	(1)	183,331	88,372	195,712	318,964	282,689	(1)	(1)	102,500	105,000
Washburn, Wis	(1)	(1)	925,000	937,564	512,885	1,011,529	711,832	1,226,277	688,931	1,721,257	688.786
Ashland, Wis	15,880,858	31,552,340	47,043,455	13,746,184	27,118,868	34,330,915	24,207,543	27,970,696	29,259,440	25,599,230	25,841,376
Ontonagon, Mich	120,609	75,520	126,313	21,200	17,670	12,195	207,675	146,796	165,620	211,495	184,061
Keweenaw Waterway, Mich. (ports on)	21,655,816	19,614,727	21,589,850	14,569,103	17,645,186	15,449,373	13,241,075	14,621,782	15,873,000	16,344,470	19,813,600
Baraga, Mich	(1)	(1)	55,000	52,100	60,421	31,010	46.516	30,000	42,500	37,800	25,894
L'Anse, Mich	(1)	(1)	52,779	62,540	29,960	(1)	855,420	3,348,281	760,613	485,890	588,498
Pequaming, Mich	(1)	(1)	672,070	248,678	629,566	487,564	278,318	3,607,333	722,932	206,061	175,525
Marquette Bay, Mich	6,473,469	6,953,660	14,985,860	2,230,410	6,277,368	9,601,328	6,111,854	8,199,564	9,057,348	8,628,709	9,382,495
Marquette, Mich	6,192,889	4,560,739	6,775,024	2,152,227	3,258,947	5,961,865	5,492,135	5,984,116	4,261,580	3,711,640	3,507,799
Munsing, Mich	(1)	(1)	30,000	55,032	44,088	134,455	51,856	140,311	266,013	318,982	365,936
Grand Marais, Mich	49,084	301,709	49,848	8,000	12,269	6,220	56,450	75,647	115,552	126,811	163,403
Shelldrake, Mich	(1)	(1)	606,275	163,901	357,017	344,775	317,134	(1)	(1)	(1)	(1)
Sault Ste. Marie, Mich	(1)	(1)	2,572,669	1,956,550	6,674,209	5,283,726	3,491,682	4,145,155	3,767,845	4,010,829	4,091,435
Total, Lake Superior	435,119,155	538,741,243	698,162,517	382,256,529	453,972,125	555,779,552	593,522,518	564,103,405	513,883,652	603,370,674	567,334,698
LAKE MICHIGAN											
Manistique, Mich	5,294,800	14,057,500	16,622,200	10,050,900	12,138,200	23,014,900	27,089,800	28,258,000	21,218,550	27,184,900	30,582,700
Gladstone, Mich	(1)	(1)	882,650	831,560	931,400	573,430	634,590	483,550	5,554,150	9,541,550	6,904,950
Escanaba, Mich	(1)	24,816,790	39,348,150	11,059,220	24,908,500	28,933,725	18,884,330	21,903,250	24,490,650	21,145,900	20,011,500
Menominee, Mich. and Wis	9,395,074	12,997,150	18,518,160	21,419,200	25,962,100	39,833,730	71,209,150	100,800,400	62,130,650	47,501,300	53,748,400
Oconto, Wis	7,970	74,720	58,950	34,760	23,450	49,000	29,050	19,200	20,000	22,000	24,000
Green Bay, Wis., including De Pere	10,976,840	8,031,900	10,801,210	10,879,420	9,856,140	11,310,240	8,082,900	9,689,050	10,155,750	25,048,100	28,461,350
Sturgeon Bay, Wis	(1)	3,232,930	(1)	744,780	965,000	1,066,300	1,092,850	1,043,700	1,013,150	1,045,400	1,201,100
Algoma, Wis	623,914	89,950	31,570	30,850	36,800	68,200	65,550	62,150	82,250	77,950	87,550
Kewaunee, Wis	9,214,620	16,529,600	18,924,940	11,974,400	14,284,250	28,965,100	54,030,530	97,197,800	73,575,900	52,229,700	84,179,750
Two Rivers, Wis	136,725	219,540	252,600	241,420	150,050	260,200	269,400	224,100	289,250	330,450	272,500
Manitowoc, Wis	72,805,380	92,993,310	116,230,550	75,664,020	7 7,629,490	128,401,590	131,848,220	196,997,800	169,686,100	178,712,000	164,640,150
Sheboygan, Wis	7,262,386	4,233,060	4,161,490	3,795,740	4,107,600	5,916,870	7,473,750	7,912,450	7,975,300	7,480,700	7,532,100
Port Washington, Wis	310,275	86,280	72,710	64,800	82,800	123,270	596,650	182,250	180,750	234,650	308,850

Milwaukee, Wis	140,734,750	320,079,300	216,381,900	201,660,800	281,415,200	415,936,200	349,913,900	450,001,200	411,139,900	466,726,000	514,399,650
Racine, Wis	7,639,250	10,670,860	9,967,250	5,000,750	5,865,850	9,097,950	8,218,950	10,818,100	8,527,600	10,416,200	7,053,000
Kenosha, Wis	4,577,300	7,610,180	13,942,570	3,815,700	11,499,780	14,525,640	21,966,700	32,138,950	25,617,900	22,307,900	20,069,100
Waukegan, Ill	2,496,300	7,258,900	5,914,940	4,277,150	3,462,332	6,437,327	3,199,492	2,121,850	1,911,136	1,170,483	1,130,986
Chicago, Ill., including Calumet	412,334,619	283,482,124	260,281,634	216,545,793	301,561,509	252,860,472	323,610,537	317,355,656	257,760,978	282,336,218	253,236,225
Indian Harbor, Ind	9,875,646	37,154,025	48,021,090	32,711,248	38,111,845	40,677,406	43,550,033	43,770,780	44,674,750	40,102,774	52,395,759
Buffington, Ind	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	769,378	1,077,205
Gary, Ind	(1)	14,052,240	28,668,675	13,427,000	15,800,000	22,969,103	16,976.730	22,812,000	22,075,917	18,423,419	24,434,450
Michigan City, Ind	750,878	280,650	2,392,290	1,009,625	385,875	1,008,430	1,051,625	1,712,750	514,175	116,820	51,450
St. Joseph, Mich	5,232,285	11,434,416	14,033,070	7,596,800	11,385,170	13,164,600	9,537,450	12,128,750	7,146,750	4,945,900	4,387,100
South Haven, Mich	1,235,501	3,247,687	3,766,480	1,816,850	2,592,100	2,499,600	2,567,670	2,259,800	1,731,200	3,140,200	2,193,500
Saugatuck, Mich	405,125	336,727	379,660	123,000	1,062,900	1,769,270	1,321,350	546,700	35,000	3,750	63,600
Holland, Mich	5,146,867	8,782,700	9,978,300	3,928,000	13,686,200	12,917,500	20,250,600	13,177,000	8,497,000	9,447,600	9,513,000
Grand Haven, Mich	52,791,865	52,866,458	76,031,920	48,435,500	101,273,860	184,991,200	141,468,800	209,780,700	173,603,750	212,468,750	247,915,700
Muskegon, Mich	7,819,964	23,028,784	20,680,900	18,762,000	41,967,900	39,565,830	27,204,100	26,930,550	25,455.450	27,703,600	28,744,700
White Lake, Mich	263,855	442,884	49,150	106,650	133,850	128,380	89,800	66,600	39,400	88,800	34,400
Pentwater, Mich	264,213	3,500	82,650	101,000	43,500	57,980	26,300	55,550	2,000	2,800	4,800
Ludington, Mich	61,283,391	171,313,245	133,384,500	100,803,800	120,435,100	165,677,050	155,271,150	222,716,200	196,903,450	185,842,000	210,414,200
Manistee, Mich	3,991,589	1,992,366	2,053,700	1,478,000	2,924,700	1,764,960	1,755,950	1,860,000	2,295,900	2,312,600	1,826,000
Portage Lake, Mich	282,950	402,400	241,760	203,290	488,800	408,000	268,450	327,150	44,850	(1)	37,305
Arcadia, Mich	298,219	93,750	75,100	5,175	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Frankfort, Mich	19,919,135	80,712,942	101,635,400	66,575,000	79,314,750	150,724,460	209,006,100	302,510,750	227,709,200	210,505,600	228,377,000
Traverse City, Mich	(1)	(1)	777,850	766,500	1,062,100	606,950	679,200	925,250	627,400	482,100	597,700
Charlevoix, Mich	1,978,757	1,068,721	1,111,260	748,200	919,400	881,570	723,000	773,700	1,318,550	758,400	501,100
Petoskey, Mich	406,985	467,192	387,290	436,900	448,000	361,500	320,600	348,500	422,150	565,400	396,300
Petoskey Portland Cement Co. Dock	(1)	(1)	(1)	(1)	(1)	580,540	798,520	633,800	908,700	944,700	1,001,550
Total, Lake Michigan	855,757,428	1,214,144,781	1,176,144,519	877,125,797	1,206,916,501	1,608,128,473	1,661,083,777	2,140,545,986	1,795,335,556	1,872,135,992	2,007,810,735
LAKE HURON											
Mackinac, Mich	2,389,434	819,950	760,459	746,310	741,750	779,900	727,250	1,021,846	1,069,000	948,835	1,124,280
Cheboygan, Mich	2,955,384	1,638,229	1,063,105	639,441	599,250	552,900	587,681	544,510	685,025	897,111	740,165
Calcite, Mich. (Rogers City)	1,551,050	3,012,023	3,817,452	2,157,029	4,031,361	4,861,047	4,753,532	6,145,041	6,611,867	7,716,737	8,381,444
Rockport, Mich	(1)	(1)	(1)	(1)	(1)	573,040	889,200	867,182	1,178,182	1,047,305	1,239,391
Alpena and Bayshore, Mich	3,249,263	3,802,176	4,896,741	3,074,733	3,432,241	3,278,940	4,481,882	6,521,313	7,975,016	8,410,286	9,210,192
Saginaw, Mich. (Saginaw River)	1,894,596	1,086,406	2,040,265	1,014,110	1,010,238	1,418,341	7,549,094	4,210,610	3,928,330	4,426,523	3,548,839
Port Crescent, Mich	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	300,100	377,949
Harbor Beach, Mich	335,223	711,614	466,492	118,047	115,134	146,175	283,185	227,192	149,193	115,317	152,559
Total, Lake Huron	12,374,950	11,070,398	13,044,514	7,749,670	9,929,974	11,610,343	19,271,824	19,537,694	21,596,613	23,862,214	24,774,819
LAKE ERIE											
Monroe, Mich	81,938	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Toledo, Ohio	25,355,100	60,866,644	75,957,116	42,854,604	63,091,768	76,185,384	63,399,750	85,108,760	77,474,958	90,644,553	93,725,306
Port Clinton, Ohio	208,555	197,221	399,771	186,890	222,250	178,539	192,700	205,368	271,537	178,380	239,445

(1) No record.

TABLE NO. 18.—*Commerce of the ports on the Great Lakes system for the calendar years 1913 and 1919 to 1928, inclusive, value of traffic*—Con.

	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE ERIE—continued											
Marblehead, Ohio	(1)	(1)	(1)	$340,875	$359,484	$267,466	$78,208	$23,139	$20,410	$55,285	$73,225
Sandusky, Ohio	$10,593,104	$16,637,001	$20,080,095	13,526,919	23,732,059	18,182,996	20,239,472	26,285,383	27,777,938	33,821,163	26,422,898
Huron, Ohio	6,534,610	12,946,057	23,574,640	10,949,382	5,996,921	13,406,519	6,835,123	7,612,857	7,746,743	6,218,274	7,312,157
Vermilion, Ohio	75,000	109,900	97,590	50,400	64,930	94,250	54,900	71,250	76,950	89,280	76,050
Lorain, Ohio	23,327,877	31,379,017	57,402,771	23,469,617	29,754,378	37,899,000	25,596,121	26,836,864	26,592,802	28,649,047	26,023,532
Cleveland, Ohio	82,761,622	179,236,538	198,105,114	90,733,355	176,323,325	182,689,288	157,270,991	194,977,063	204,535,363	188,546,761	210,543,935
Fairport, Ohio	21,277,106	14,936,079	12,878,298	14,612,698	16,796,828	24,459,246	25,569,133	41,941,156	35,422,063	32,502,891	42,286,877
Ashtabula, Ohio	45,952,628	72,667,720	125,204,000	97,216,894	73,348,593	93,902,618	51,464,370	53,784,084	62,612,996	57,474,741	67,681,291
Conneaut, Ohio	36,109,259	52,597,030	68,592,461	40,700,253	49,141,987	69,409,947	46,062,543	48,136,519	53,622,373	38,387,027	47,182,425
Put-in-Bay, Ohio	(1)	(1)	(1)	1,884,975	2,288,088	1,285,330	993,855	900,275	153,180	135,028	239,673
Kelleys Island, Ohio	(1)	(1)	(1)	789,325	1,775,726	1,400,863	1,704,832	948,747	434,989	447,535	423,961
North Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	125,025	48,524	17,795	21,010	34,868
Middle Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	223,105	184,979	166,019	154,649	171,209
Erie, Pa	78,576,009	42,063,206	55,041,418	27,479,218	50,168,903	53,154,947	44,839,383	22,799,702	36,345,861	40,576,839	36,802,160
Dunkirk, N. Y	(1)	240,525	141,436	153,916	236,544	313,012	225,717	148,737	115,329	102,056	53,019
Buffalo, N. Y. (by lake)	393,963,380	462,735,245	484,148,006	440,374,572	537,697,869	505,909,555	650,154,084	612,742,412	498,405,298	603,855,802	632,317,412
Buffalo, N. Y. (by canal)	22,048,638	22,735,161	33,002,560	26,028,764	40,936,815	39,447,764	46,455,305	51,554,896	69,107,684	59,294,074	71,346,377
Total, Lake Erie	746,864,826	969,347,344	1,154,625,276	831,352,657	1,071,936,468	1,118,186,724	1,141,484,617	1,174,310,715	1,100,900,288	1,181,154,395	1,262,955,820
LAKE ONTARIO											
Charlotte, N. Y	4,231,218	5,910,291	16,527,691	5,253,947	5,429,000	7,787,277	10,791,408	7,216,307	9,671,626	8,794,404	10,842,606
Great Sodus, N. Y	175,803	622,356	123,971	822,973	620,681	523,115	517,603	1,063,973	1,197,837	768,149	2,288,699
Little Sodus, N. Y	555,728	718,811	1,149,923	798,160	379,374	1,132,465	525,756	623,620	676,487	128,453	105,651
Oswego, N. Y. (by lake)	4,135,003	3,719,041	4,377,368	3,588,756	2,197,653	4,714,900	5,022,315	7,695,055	2,778,497	5,789,790	8,584,325
Oswego, N. Y. (by canal)	(1)	176,412	121,578	916,148	(1)	503,495	4,294,369	6,805,167	3,270,129	7,364,441	16,346,046
Sackets Harbor, N. Y	(1)	(1)	(1)	(1)	(1)	(1)	718,573	633,171	249,760	263,858	402,003
Total, Lake Ontario	9,097,752	11,146,911	22,300,531	11,379,984	8,626,708	14,661,252	21,870,024	24,037,293	17,844,276	23,109,095	38,569,330
Grand total, Great Lakes	2,059,214,111	2,744,450,677	3,064,277,357	2,109,864,637	2,751,381,776	3,308,366,344	3,437,232,760	3,922,585,093	3,449,560,385	3,703,632,370	3,901,445,402
NIAGARA RIVER											
Tonawanda, N. Y. (by lake and river)	11,122,238	10,350,907	9,741,001	5,196,253	6,073,063	2,438,794	2,961,418	4,185,885	2,591,370	2,782,846	1,688,475
Niagara River, N. Y	783,150	93,000	116,936	139,847	224,504	203,297	151,939	178,553	608,610	1,070,164	1,040,365
Lewiston, N. Y	(1)	(1)	(1)	66,808	82,712	71,093	56,149	35,971	205,632	429,201	511,165
Total, Niagara River	11,905,388	10,443,907	9,857,937	5,402,908	7,380,279	2,713,184	3,169,506	4,400,409	3,405,612	4,282,211	3,240,005

ST. LAWRENCE RIVER											
Cape Vincent, N. Y.	453, 536	373, 232	368, 885	244, 892	224, 772	283, 529	264, 680	200, 227	380, 244	288, 854	228, 785
Clayton, N. Y.	(1)	(1)	54, 128	81, 509	45, 553	48, 728	109, 662	199, 453	25, 160	85, 772	193, 655
Morristown, N. Y.	(1)	(1)	399, 660	172, 406	143, 738	367, 396	316, 680	538, 546	498, 675	695, 721	727, 972
Ogdensburg, N. Y.	68, 886, 793	160, 108, 513	132, 340, 655	110, 479, 197	131, 808, 105	134, 522, 043	125, 383, 932	95, 340, 785	65, 673, 271	71, 666, 576	72, 657, 040
Waddington, N. Y.	(1)	(1)	760, 470	(1)	201, 057	327, 293	553, 524	695, 063	710, 530	709, 660	859, 818
Alexandria Bay, N. Y.	(1)	(1)	99, 982	130, 418	149, 906	200, 248	161, 290	167, 539	156, 063	142, 745	137, 347
Total, St. Lawrence River	69, 340, 329	160, 481, 745	134, 023, 780	111, 108, 422	132, 573, 131	135, 749, 237	126, 789, 768	97, 141, 613	67, 443, 943	73, 589, 328	74, 804, 617
CONNECTING CHANNELS (PORTS ON)											
Port Huron, Mich. (Black and St. Clair Rivers)	[2] 534, 298	4, 171, 196	2, 471, 022	2, 444, 649	6, 229, 032	2, 708, 244	4, 434, 988	20, 212, 346	22, 893, 258	40, 153, 857	26, 542, 376
Detroit, Mich.	(1)	(1)	92, 148, 037	41, 706, 455	87, 817, 836	149, 609, 148	109, 801, 185	162, 050, 716	211, 373, 968	246, 540, 014	289, 814, 615
Rouge River, Mich.	4, 401, 466	4, 008, 555	8, 091, 480	2, 873, 597	4, 676, 034	6, 605, 552	9, 870, 105	14, 163, 285	10, 447, 670	12, 737, 504	38, 615, 845
Wyandotte, Mich.	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1, 945, 438	1, 981, 050	1, 226, 371	2, 497, 144
Clinton River, Mich.	40, 256	22, 710	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Total, connecting channels	4, 976, 020	8, 202, 461	102, 710, 539	47, 024, 701	98, 722, 902	158, 922, 944	124, 106, 278	198, 371, 785	246, 695, 946	300, 657, 746	357, 469, 980
Gross total, lakes, rivers, and connecting channels	2, 145, 435, 848	2, 923, 578, 790	3, 310, 869, 613	2, 273, 400, 668	2, 990, 058, 088	3, 605, 751, 709	3, 691, 298, 312	4, 222, 448, 900	3, 767, 105, 886	4, 082, 161, 655	4, 336, 960, 004
Grand net total after eliminating duplications	[3]	1, 144, 939, 618	1, 406, 111, 607	957, 770, 428	1, 289, 419, 236	1, 383, 903, 308	1, 968, 533, 514	2, 280, 304, 440	2, 109, 392, 255	2, 313, 139, 907	2, 496, 751, 407

[1] No record.

[2] Black River traffic only.

[3] Not ascertained.

PASSENGER TRAFFIC ON THE GREAT LAKES

During the calendar year 1928, the total number of all kinds of passengers on the Great Lakes system amounted to 26,277,405. The average number carried during the past 10 years was 22,460,000, the majority being passengers carried by ferry. Because of this, Detroit led by a large margin since 15,676,020 passengers were carried by ferry across Detroit River, 1,487,332 were excursionists to nearby points and 394,930 were carried to and from other ports on the Great Lakes system.

Among the more important passenger traffic ports for the calendar year 1928, are Buffalo, with 1,526,616 regular passengers and 924,532 ferry passengers; Sandusky, with 1,071,232 ferry passengers and 295,697 other passengers; Chicago, with 711,740 passengers of all kinds, and Milwaukee with 240,332.

The following table shows the passenger traffic at the ports on the Great Lakes system, as also the totals carried on the individual lakes and the rivers and connecting channels.

TABLE NO. 19.—*Passengers carried on the Great Lakes system in 1913 and 1919–1928, inclusive*

Ports	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE SUPERIOR											
Grand Portage, Minn	(1)	(1)	494	410	180	222	58	27	15	25	(1)
Grand Marais, Minn	3,711	1,510	2,003	1,550	1,207	1,422	506	494	212	260	(1)
Agate Bay, Minn	7,886	742	1,142	554	328	307	199	145	175	131	(1)
Duluth-Superior, Minn. and Wis	65,343	40,119	43,876	43,368	40,205	44,291	38,177	41,360	32,472	32,371	30,117
Port Wing, Wis	753	3,778	5,281	1,944	65	129	731	55	(1)	(1)	(1)
Cornucopia, Wis	(1)	(1)	(1)	70	3,266	3,662	2,677	144	86	(1)	(1)
Ashland, Wis	57,728	32,435	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Keweenaw Waterway, Mich	26,836	25,986	22,922	19,750	20,673	25,047	16,749	19,775	17,393	16,605	18,597
Marquette, Mich	(2)	(2)	(2)	(2)	(2)	(2)	(2)	400	(2)	(2)	(2)
Grand Marais, Mich	151	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Shelldrake, Mich	(1)	(1)	783	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Total, Lake Superior	162,408	104,570	76,501	67,646	65,924	65,966	59,097	62,400	50,267	49,392	48,714
LAKE MICHIGAN											
Manistique, Mich	700	250	500	551	977	1,270	634	634	850	713	887
Escanaba, Mich	(1)	(1)	(1)	200	294	429	166	179	215	347	500
Menominee, Mich. and Wis	4,000	1,000	2,740	3,329	3,335	8,563	6,069	2,248	3,532	4,134	5,715
Oconto, Wis	330	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Green Bay, Wis., including De Pere	8,425	24	2,877	926	431	173	(1)	(1)	(1)	110	120
Sturgeon Bay, Wis	14,641	8,759	6,077	7,524	7,095	7,058	11,523	7,349	7,947	6,851	8,949
Algoma, Wis	160	35	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Kewaunee, Wis	352	500	1,000	90	157	206	196	276	281	400	1,441
Manitowoc, Wis	1,500	3,300	7,500	3,456	1,339	5,603	6,778	7,450	8,281	11,872	15,696
Sheboygan, Wis	350	2,412	(1)	(1)	(1)	5,865	554	701	4,077	583	1,776
Port Washington, Wis	50	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Milwaukee, Wis	150,000	130,342	320,680	292,072	180,038	200,837	263,389	307,342	281,215	220,809	240,332
Racine, Wis	957	2,269	532	673	27,559	29,329	32,023	38,086	30,737	30,799	35,349
Kenosha, Wis	5,000	1,500	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Waukegan, Ill	33,645	2,500	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Chicago, Ill., including Calumet	1,129,253	1,075,606	971,846	1,368,850	1,317,212	1,283,468	1,090,159	1,261,868	1,135,831	808,557	711,740
Michigan City, Ind	162,322	23,119	20,611	40,700	72,270	96,348	88,431	100,653	95,377	70,684	63,452
St. Joseph, Mich	255,218	103,248	88,183	270,594	218,839	214,967	140,520	141,442	118,869	77,965	78,761
South Haven, Mich	156,216	33,518	17,426	77,938	83,879	73,235	50,196	52,669	58,996	115,334	88,542
Saugatuck, Mich	4,681	1,296	(1)	(1)	18,481	16,529	11,799	8,044	7,759	(1)	3,684
Holland, Mich	77,678	47,769	35,418	52,368	47,205	36,736	29,057	24,647	17,095	14,033	11,081
Grand Haven, Mich	84,830	40,229	33,720	45,882	31,152	31,533	38,128	52,893	51,749	42,292	33,733
Muskegon, Mich	69,774	90,893	95,870	76,207	79,005	86,551	64,760	84,596	59,338	64,659	62,690
White Lake, Mich	15,906	10,951	9,897	12,966	12,327	14,018	13,448	14,922	13,132	11,511	5,828
Pentwater, Mich	5,286	(1)	6	(1)	17	(1)	(1)	(1)	(1)	(1)	(1)
Ludington, Mich	41,562	30,781	27,985	26,560	29,560	28,505	29,303	30,783	29,031	34,843	38,037

[1] No record.

[2] No passengers.

TABLE NO. 19.—*Passengers carried on the Great Lakes system in 1913 and 1919–1928, inclusive*—Continued

Ports	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE MICHIGAN—continued											
Manistee, Mich	25,809	9,909	7,837	8,055	8,897	8,674	7,809	8,829	6,640	6,344	6,136
Portage Lake, Mich	7,197	5,196	3,143	3,567	4,129	2,905	2,034	1,901	58	(1)	671
Arcadia, Mich	795	37	48	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Frankfort, Mich	6,765	5,140	6,800	6,437	9,001	11,195	8,887	11,161	8,392	9,320	11,485
Traverse City, Mich	(1)	(1)	236	1,005	1,005	753	1,365	870	268	255	274
Charlevoix, Mich	10,207	6,719	7,633	8,322	5,423	5,023	4,117	6,909	4,724	3,948	5,520
Petoskey, Mich	2,307	29,095	2,502	3,997	3,248	628	564	498	41,660	30,306	38,459
Total, Lake Michigan	2,275,916	1,666,397	1,671,067	2,312,269	2,162,875	2,170,401	1,900,909	2,166,850	1,986,054	1,566,669	1,470,858
LAKE HURON											
Mackinac, Mich	300,000	45,100	72,200	109,030	74,760	88,427	82,518	262,665	276,702	300,191	305,000
Cheboygan, Mich	(1)	2,488	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Rockport, Mich	(1)	375,139	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Alpena, Mich	(1)	----------	7,500	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Harbor Beach, Mich	(1)	5,014	2,923	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Total, Lake Huron	300,000	427,741	82,623	109,030	74,760	88,427	82,518	262,665	276,702	300,191	305,000
LAKE ERIE											
Toledo, Ohio	(1)	295,009	132,144	178,830	215,948	181,708	222,604	245,582	107,358	109,665	134,896
Port Clinton, Ohio	(1)	9,780	7,270	6,347	6,400	5,500	7,000	(2)	(2)	5,315	7,596
Marblehead, Ohio	(1)	(1)	(1)	3,853	26,782	29,000	15,120	20,625	18,192	(2)	11
Sandusky, Ohio	945,112	1,009,334	1,123,070	1,030,275	1,825,821	1,203,045	1,076,591	1,140,569	897,225	1,333,903	1,366,929
Lorain, Ohio	5,035	(1)	1,829	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Cleveland, Ohio	554,642	624,715	656,231	464,461	492,454	496,806	602,323	543,816	641,769	470,418	450,988
Ashtabula, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	774	3,606
Put-in-Bay, Ohio	(1)	(1)	(1)	309,884	277,655	391,353	417,980	401,474	243,585	158,960	220,297
Kelleys Island, Ohio	(1)	(1)	(1)	17,186	13,327	18,044	19,906	15,952	19,612	17,835	22,955
North Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	7,500	2,904	2,487	3,379	2,718
Middle Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	75,730	5,931	7,162	6,350	7,116
Erie, Pa	5,000	11,181	12,051	12,375	27,041	27,589	30,720	31,928	14,242	31,231	41,406
Dunkirk, N. Y	(1)	1,000	900	(1)	(1)	(1)	(1)	830	2,632	(2)	(2)
Buffalo, N. Y	1,401,706	1,894,662	1,738,111	1,586,761	1,557,552	2,712,179	2,586,492	1,999,060	3,826,339	3,400,379	2,451,148
Total, Lake Erie	2,911,495	3,945,681	3,671,606	3,609,972	4,442,980	5,065,224	5,061,966	4,408,671	5,780,603	5,538,209	4,709,666

LAKE ONTARIO											
Charlotte, N. Y	284,666	29,480	47,127	37,183	32,555	41,455	41,242	94,625	81,854	88,832	81,980
Total, Great Lakes	5,934,485	6,173,869	5,548,924	6,136,100	6,779,094	7,431,473	7,145,732	6,995,211	8,175,480	7,543,293	6,616,218
NIAGARA RIVER											
Tonawanda, N. Y	534,075	92,535	77,300	43,527	(2)	(2)	(2)	4,456	3,572	3,351	3,166
Lewiston, N. Y	(1)	(1)	(1)	201,038	204,085	240,381	199,904	236,773	181,727	179,729	159,201
Total, Niagara River	534,075	92,535	77,300	244,565	204,085	240,381	199,904	241,229	185,299	183,080	162,367
ST. LAWRENCE RIVER											
Cape Vincent, N. Y	17,499	23,222	22,344	31,782	34,938	40,192	39,158	37,405	34,441	29,669	31,736
Clayton, N. Y	(1)	(1)	12,000	18,788	23,000	80,750	86,500	53,808	86,396	135,115	151,757
Morristown, N. Y	(1)	(1)	27,258	27,253	33,818	95,924	69,326	76,826	142,870	148,911	171,043
Ogdensburg, N. Y	360,722	264,125	250,000	240,000	306,800	315,000	167,612	377,311	335,281	436,873	460,651
Waddington, N. Y	----------	(1)	5,592	4,702	4,530	6,332	4,849	7,714	13,530	12,078	31,450
Alexandria Bay, N. Y	(1)	(1)	31,705	31,542	39,146	78,000	36,265	41,275	196,366	303,622	259,401
Total, St. Lawrence River	378,221	287,347	348,899	354,067	442,232	616,198	403,710	594,339	808,884	1,066,268	1,106,038
CONNECTING CHANNELS (PORTS ON)											
Port Huron, Mich	(1)	778,000	812,000	825,000	1,030,000	1,039,430	1,140,000	1,270,700	1,069,780	(2)	834,500
Detroit, Mich	(1)	(1)	13,167,000	11,873,949	13,598,500	14,779,800	15,048,700	16,549,700	18,600,930	18,221,930	17,558,282
Total, connecting channels	----------	778,000	13,979,000	12,698,949	14,628,500	15,819,230	16,188,700	17,820,400	19,670,710	18,221,930	18,392,782
Grand total, lakes, rivers, and connecting channels	6,846,781	7,331,751	19,954,123	19,433,681	22,053,911	24,107,282	23,938,046	25,651,179	28,840,373	27,014,571	26,277,405

[1] No record.

[2] No passengers.

NET TONNAGE OF VESSELS ON THE GREAT LAKES

Table No. 20 shows the net registered tonnage of vessels entering and clearing the United States ports on the Great Lakes system during the calendar years 1913 and 1919 to 1928, inclusive.

Since the cargo tonnage on the Great Lakes was greatest in 1928, the total net registered tonnage was also the greatest, amounting to 326,078,559 tons for the five lakes, with additional tonnage of 46,731,800 for the rivers and connecting channels, making a grand total of 372,810,359 net registered tons.

CONNECTING WATERWAYS

ST. MARYS FALLS CANAL

A good measure of the growth of the commerce on the Great Lakes is the traffic passing through the St. Marys Falls Canal, also known as the Soo Canal. Since 1855, when a total of 14,503 tons passed through this canal, the tonnage has steadily increased until in 1916 the total was 91,888,219 short tons, which amount was nearly equalled in 1923 with 91,379,658 tons. In 1928 the total was 86,992,997 tons, the reduction being largely in the amount of iron ore transported.

The dominant commodity has always been iron ore, which amounted to 11,447 tons in 1855 and reached its peak in 1916 with 63,452,107 tons, since which time it has declined to as low as 22,595,325 tons in 1921, a year of general depression in transportation on the Great Lakes.

Coal and grain have always been important items of traffic through this waterway. The movement of lumber, starting with about 250 tons in 1855, reached its peak in 1902, during which year about 2,100,000 tons traversed the canal, but has steadily declined until only 379,565 tons were transported in 1928. Other items of importance are flour, general merchandise, stone, oil, manufactured and pig iron, copper, and salt.

The following table shows the traffic through the canal, by commodities, for the years 1855 to 1923, inclusive.

TABLE NO. 20.—*Net registered tonnage of vessels engaged in traffic on the Great Lakes system, 1913 and 1919–1928, inclusive*

[Car-ferry tonnage included]

Ports	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE SUPERIOR											
Grand Portage, Minn	(1)	(1)	77,298	(1)	74,718	78,852	38,646	71,398	8,882	8,734	
Grand Marais, Minn	106,984	96,568	79,396	82,718	208,836	161,866	150,830	347,134	307,712	256,128	131,386
Beaver Bay, Minn	(1)	(1)	(1)	(1)	(1)	1,548	7,136	(1)	(1)	(1)	(1)
Agate Bay, Minn	10,753,780	6,566,202	9,273,735	3,555,546	6,518,902	6,684,908	5,792,240	6,754,966	6,811,290	6,023,498	11,346,096
Duluth-Superior, Minn. and Wis	35,982,013	32,929,658	35,124,556	20,746,127	32,347,589	46,021,670	37,703,265	44,374,820	45,111,105	42,286,498	42,458,153
Port Wing, Wis	100,240	35,112	41,344	37,026	34,654	40,674	39,950	11,302	23,568	(2)	(2)
Cornucopia, Wis	(1)	(1)	38,524	(1)	34,680	39,138	36,818	6,772	30,836	123,344	(1)
Bayfield, Wis	(1)	(1)	6,574	(1)	7,150	10,620	14,090	(2)	(2)	(1)	(1)
Washburn, Wis	(1)	(1)	75,804	(1)	43,420	132,000	101,560	187,872	46,378	157,206	95,392
Ashland, Wis	4,198,201	5,692,082	7,575,804	2,198,522	5,683,976	6,083,578	4,767,116	7,178,880	7,937,170	7,388,000	6,839,408
Ontonagon, Mich	160,000	5,816	9,822	4,358	5,450	3,680	45,946	50,144	62,846	109,292	76,590
Keweenaw Waterway, Mich. (ports on)	[3] 1,261,925	[3] 1,347,604	[3] 1,123,627	[3] 1,051,767	[3] 1,181,778	[3] 1,501,509	[3] 1,394,185	[3] 1,335,837	[3] 1,463,642	[3] 1,477,703	[3] 1,496,563
Baraga, Mich	(1)	(1)	4,800	(1)	4,446	4,884	5,732	5,732	7,362	6,000	3,276
L'Anse, Mich	(1)	(1)	1,522	(1)	2,600	(2)	105,172	40,641	96,486	181,740	147,736
Pequaming, Mich	(1)	(1)	17,238	(1)	24,400	20,078	63,012	25,616	53,432	36,636	20,600
Marquette Bay, Mich	2,277,038	1,370,086	2,728,658	600,562	1,674,810	2,067,000	1,548,934	2,563,144	2,580,960	2,721,536	2,638,348
Marquette, Mich	654,963	1,112,070	776,169	529,098	839,295	600,524	1,316,454	1,772,562	1,261,646	1,074,336	1,028,790
Munising, Mich	(1)	(1)	2,120	(1)	3,342	2,132	10,330	5,168	67,872	87,006	109,972
Grand Marais, Mich	124,076	24,388	17,182	14,558	39,811	8,944	13,950	8,336	12,568	6,862	17,338
Shelldrake, Mich	(1)	(1)	19,480	(1)	18,450	15,360	16,740	(2)	(2)	(2)	(2)
Sault Ste. Marie, Mich	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Emerson, Mich	(1)	(1)	10,935	(1)	(1)	(1)	(1)	(1)	(1)	(1)	
Total, Lake Superior	55,619,220	49,179,586	57,004,588	28,620,282	48,748,307	63,478,965	53,171,806	64,738,324	65,883,755	61,944,519	66,409,648
LAKE MICHIGAN											
Mainstique, Mich	416,439	651,677	467,632	424,350	1,063,296	897,680	873,620	883,482	853,690	959,206	936,934
Gladstone, Mich	(1)	(1)	51,025	89,988	98,714	103,320	90,276	92,718	236,944	374,414	332,892
Escanaba, Mich	(1)	(1)	3,960,361	2,526,642	5,670,380	6,455,536	5,130,830	7,450,234	7,736,700	6,931,284	5,720,094
Menominee, Mich. and Wis	356,641	483,712	391,297	577,774	1,241,126	1,494,486	1,510,458	1,754,924	1,012,394	2,003,440	2,184,706
Oconto, Wis	703	[4] 269	[4] 274	[4] 212	[4] 86	1,148	(1)	(1)	(1)	(1)	(1)
Green Bay, Wis., including De Pere	553,539	512,141	576,990	567,623	921,754	1,415,364	1,245,954	1,491,378	1,768,126	2,363,940	2,530,754
Sturgeon Bay, Wis	[3] 1,348,372	[3] 928,391	[3] 877,106	[3] 1,289,580	[3] 1,296,928	[3] 3,030,236	[3] 1,665,289	[3] 2,123,949	[3] 2,323,891	[3] 2,426,233	[3] 2,798,555
Algoma, Wis	70,179	26,456	106	597	8,994	2,812	3,142	2,392	2,024	17,410	13,472
Kewaunee, Wis	423,876	422,724	774,022	762,936	691,644	872,372	1,374,840	1,875,616	1,866,570	1,923,960	2,678,006
Two Rivers, Wis	16,405	31,446	24,964	16,720	17,310	37,476	59,952	82,796	75,830	90,754	63,588
Manitowac, Wis	2,636,420	2,548,506	2,480,526	4,375,234	4,983,438	5,482,440	5,467,977	6,492,018	7,182,196	7,829,892	8,681,064
Sheboygan, Wis	579,998	293,473	245,378	425,052	472,222	976,496	1,283,804	1,140,546	1,269,928	1,981,696	1,962,364
Port Washington, Wis	21,561	5,300	565	5,240	5,898	14,408	39,338	47,692	52,194	40,712	39,062
Milwaukee, Wis	9,013,650	6,728,745	5,492,114	5,839,562	12,274,040	15,874,664	15,378,290	17,583,841	17,703,506	19,963,056	21,205,334
Racine, Wis	1,108,687	994,239	835,919	1,741,002	1,837,832	2,049,492	1,910,102	2,209,900	1,096,066	2,119,328	2,284,710
Kenosha, Wis	199,449	89,954	96,071	415,668	326,000	741,442	1,230,390	1,256,860	1,243,632	1,094,904	1,082,332
Waukegan, Ill	340,873	141,057	94,792	297,980	88,368	16,876	512,735	452,828	399,978	230,642	169,050

[1] No record. [2] No traffic. [3] Local and through traffic not separable. [4] Includes New York State Barge Canal vessels, not separable.

TABLE NO. 20.—*Net registered tonnage of vessels engaged in traffic on the Great Lakes system, 1913 and 1919–1928, inclusive*—Continued

[Car-ferry tonnage included]

Ports	1913	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
LAKE MICHIGAN—continued											
Chicago, Ill., including Calumet	(1)	12,298,817	14,185,774	11,306,436	14,908,659	18,186,900	15,346,103	17,655,946	----------	25,421,199	20,903,072
Indiana Harbor, Ind	(1)	2,374,610	2,707,975	2,109,750	2,389,795	3,976,314	3,948,599	4,631,582	6,562,936	10,454,682	5,906,142
Buffington, Ind	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1,205,178	1,338,358
Gary, Ind	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	6,465,744	5,055,742	9,487,240
Michigan City, Ind	35,804	5,843	20,611	43,936	320,381	323,356	223,118	395,244	230,706	155,141	----------
St. Joseph, Mich	1,469,288	887,814	611,528	928,890	1,001,030	997,910	1,110,984	928,560	1,025,476	1,151,692	1,129,642
South Haven, Mich	484,934	232,970	172,926	302,362	349,254	332,190	301,434	302,462	287,612	705,936	559,620
Saugatuck, Mich	37,224	14,920	16,832	12,558	171,988	160,560	161,346	66,128	70,708	(1)	50,640
Holland, Mich	838,474	456,318	411,844	609,522	677,046	714,118	735,242	559,738	666,710	735,676	600,300
Grand Haven, Mich	4,496,468	3,759,536	3,125,232	3,217,132	3,493,378	4,018,024	4,162,234	4,998,624	5,751,378	7,044,500	7,531,158
Muskegon, Mich	1,298,028	1,248,942	1,050,352	1,125,366	1,232,288	1,566,938	1,393,358	1,984,358	1,991,416	1,855,860	2,174,708
White Lake, Mich	110,084	50,552	52,204	79,738	111,756	88,526	89,238	73,920	65,848	106,346	40,802
Pentwater, Mich	149,032	(1)	4,860	3,896	5,992	4,320	4,456	4,804	(1)	(1)	(1)
Ludington, Mich	6,923,529	8,049,416	6,301,648	6,269,958	7,373,726	7,604,488	8,102,100	9,399,470	10,071,158	9,503,852	10,571,872
Manistee, Mich	1,353,678	641,734	445,844	569,048	743,046	727,656	714,462	756,652	715,276	672,028	720,028
Portage Lake, Mich	448,316	368,858	238,584	195,126	336,052	189,054	229,008	183,142	3,596	(1)	65,884
Arcadia, Mich	131,856	6,696	2,700	348	(2)	(2)	(2)	(2)	(2)	(1)	(1)
Frankfort, Mich	3,143,432	4,662,490	4,486,618	4,503,404	4,218,098	4,164,768	4,516,998	5,224,640	5,626,538	6,304,598	5,932,028
Traverse City, Mich	(1)	(1)	80,350	173,966	151,712	194,664	233,562	193,746	190,462	298,038	174,202
Charlevoix, Mich	868,490	887,682	579,162	324,712	540,578	613,214	606,210	566,962	464,592	441,468	386,776
Petoskey, Mich	253,110	145,412	275,570	329,124	247,060	167,466	136,694	132,272	41,298	136,966	171,640
Total, Lake Michigan	39,128,439	49,945,700	51,139,256	51,056,432	69,269,869	83,496,714	79,792,143	92,954,424	85,073,123	121,599,773	120,427,029
LAKE HURON											
Mackinac, Mich	1,246,853	760,254	1,399,284	984,969	896,801	609,812	567,031	800,817	761,290	1,585,960	1,124,978
Cheboygan, Mich	(1)	32,017	50,412	35,331	24,287	20,525	21,719	43,372	62,892	84,064	43,928
Calcite, Mich (Rogers City)	668,500	(1)	5,189,920	2,803,577	2,610,500	3,451,630	3,184,707	8,354,136	8,751,972	9,511,582	9,755,436
Rockport, Mich	(1)	(1)	(1)	(1)	(1)	462,238	646,643	1,756,776	1,990,556	1,767,290	1,893,624
Alpena, Mich	(1)	377,550	849,912	541,088	799,958	380,306	51,935	95,510	74,722	51,202	86,140
Saginaw, Mich	261,495	80,227	70,166	64,403	62,447	152,143	251,017	556,934	527,764	617,882	517,032
Port Crescent, Mich	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	433,342	531,134
Harbor Beach, Mich	(1)	264,336	222,316	35,425	36,175	33,638	131,891	200,088	95,096	94,380	167,884
Total, Lake Huron	2,176,848	1,514,384	7,782,010	4,464,793	4,430,168	5,110,292	4,854,943	11,817,633	12,264,292	14,145,702	14,120,156
LAKE ERIE											
Monroe, Mich	5,353	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(1)	(1)
Toledo, Ohio	7,829,188	10,201,156	10,109,539	9,619,366	9,479,355	12,045,540	12,170,147	17,819,739	17,204,034	20,110,338	19,379,464
Port Clinton, Ohio	36,596	23,769	36,230	22,518	22,538	24,428	31,428	28,912	18,620	25,390	22,940
Marblehead, Ohio	(1)	(1)	(1)	77,984	158,870	198,754	150,588	171,664	84,996	94,492	75,062
Sandusky, Ohio	3,962,834	2,749,557	2,889,916	3,105,663	5,596,422	5,179,993	5,766,308	8,240,798	9,123,700	10,545,350	9,350,592
Huron, Ohio	2,735,849	2,636,542	3,901,893	2,073,784	1,175,148	2,779,397	1,940,732	2,064,442	2,278,690	1,739,984	1,988,165
Vermilion, Ohio	59,090	55,948	55,640	50,228	53,530	56,702	50,392	38,182	67,592	54,256	39,204
Lorain, Ohio	8,609,897	6,637,756	7,737,518	4,641,908	5,169,186	7,894,383	6,439,070	7,323,491	7,250,267	7,923,296	6,975,628
Cleveland, Ohio	19,282,292	15,578,849	14,056,538	9,376,837	13,355,676	15,343,062	13,482,290	17,072,519	18,051,059	17,187,536	17,922,694

Fairport, Ohio	3,760,309	2,395,662	1,855,583	1,945,948	2,151,996	3,069,270	4,542,087	5,703,955	5,096,693	5,437,092	5,873,187
Ashtabula, Ohio	14,401,665	13,056,093	17,176,096	7,732,976	11,820,251	14,790,190	10,281,296	11,594,637	13,334,624	12,191,819	11,937,329
Conneaut, Ohio	10,856,396	9,237,665	8,827,226	7,140,134	8,419,188	12,269,632	9,621,309	10,318,887	14,598,577	9,318,232	10,593,486
Put-in-Bay, Ohio	(1)	(1)	(1)	598,940	629,206	784,278	556,572	523,184	546,284	673,494	969,458
Kelleys Island, Ohio	(1)	(1)	(1)	113,610	644,784	966,826	508,666	837,924	435,334	666,402	454,050
North Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	69,010	58,320	61,704	66,372	55,104
Middle Bass Island, Ohio	(1)	(1)	(1)	(1)	(1)	(1)	163,568	149,082	145,406	154,848	134,640
Erie, Pa	2,360,912	2,314,998	3,301,661	1,595,163	1,639,788	2,512,079	1,934,086	1,356,378	2,657,410	3,298,737	1,893,120
Dunkirk, N. Y	3,726	4,480	4,149	1,151	3,712	15,368	12,900	20,971	75,820	119,386	66,428
Buffalo, N. Y. (by lake)[5]	19,954,521	13,900,057	15,924,717	13,163,073	18,659,948	17,392,998	18,883,293	21,266,150	28,378,504	22,344,030	30,175,261
Total, Lake Erie	93,858,628	78,792,532	85,876,706	61,259,283	78,979,598	95,322,900	86,603,742	104,589,235	119,409,314	111,951,054	117,905,812
LAKE ONTARIO											
Charlotte, N. Y	4,210,505	3,480,113	4,534,091	4,362,676	2,044,050	5,170,454	8,701,071	4,605,657	4,647,610	5,140,390	6,276,784
Great Sodus, N. Y	55,824	203,594	20,249	178,648	70,418	118,971	120,606	300,567	352,328	244,452	553,632
Little Sodus, N. Y	115,535	76,216	116,681	96,401	23,701	123,470	41,542	59,082	56,497	77,236	14,740
Oswego, N. Y. (by lake)	879,615	573,552	552,247	413,182	260,998	455,919	440,860	393,069	261,096	257,642	354,192
Sacket Harbor, N. Y	(1)	(1)	(1)	(1)	(1)	(1)	15,958	31,626	10,542	15,060	16,566
Total, Lake Ontario	5,261,479	4,333,475	5,223,268	5,050,907	2,399,167	5,868,814	9,320,037	5,390,001	5,328,073	5,734,780	7,215,914
NIAGARA RIVER											
Tonawanda, N. Y	823,060	[4] 151,053	[4] 141,570	[4] 104,422	[4] 148,164	[4] 125,079	[4] 343,978	442,982	564,075	532,096	500,936
Niagara Falls, N. Y	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Lewiston, N. Y	(1)	(1)	(1)	508,527	964,742	557,811	1,180,274	1,374,420	1,306,424	1,276,752	1,218,830
Total, Niagara River	823,060	151,053	141,570	612,949	1,112,906	682,890	1,524,252	1,817,402	1,870,499	1,808,848	1,719,766
ST. LAWRENCE RIVER											
Cape Vincent, N. Y	82,214	26,813	68,276	358,450	450,514	558,235	776,672	567,318	457,490	1,873,708	1,800,658
Clayton, N. Y	(1)	(1)	407,778	374,180	387,077	437,293	485,148	989,906	829,316	1,257,510	7,316,020
Morristown, N. Y	(1)	(1)	27,542	23,758	11,900	221,793	251,992	312,172	1,278,716	1,210,160	1,182,614
Ogdensburg, N. Y	1,281,257	5,492,722	5,583,312	6,343,143	6,659,179	8,354,695	7,730,186	7,831,661	11,963,378	10,385,926	10,633,468
Waddington, N. Y	(1)	(1)	49,111	5,572	17,551	25,619	40,314	118,282	318,836	436,180	498,078
Alexandria, N. Y	(1)	(1)	402,007	368,373	346,007	427,366	423,408	813,190	523,482	560,438	714,826
Total, St. Lawrence River	1,363,471	5,519,535	6,538,026	7,473,476	7,872,228	10,025,001	9,707,720	10,632,529	15,371,218	15,723,923	22,145,664
CONNECTING CHANNELS (PORTS ON)											
Port Huron, Mich. (Black and St. Clair Rivers)	(1)	47,769	374,722	389,879	302,996	523,397	593,777	693,100	745,420	1,370,034	1,841,788
Detroit, Mich	(1)	(1)	3,445,181	3,188,105	4,199,845	4,864,940	6,795,678	11,022,145	10,892,750	12,921,695	14,378,214
Rouge River, Mich	(1)	628,160	805,097	549,763	708,998	931,737	1,501,370	4,211,106	4,484,300	4,479,350	5,542,624
Wyandotte, Mich	(1)	(1)	(1)	(1)	(1)	(1)	(1)	898,388	1,019,376	735,190	1,103,744
Total, connecting channels	----------	675,929	4,625,000	4,127,747	5,211,839	6,320,074	8,890,825	16,824,739	17,141,846	19,506,269	22,866,370
Grand total, lakes, rivers, and connecting channels	198,231,145	190,112,194	218,330,424	162,665,869	218,024,082	270,305,650	253,865,468	308,764,287	322,342,120	352,414,868	372,810,359

[1] No record. [2] No traffic. [4] Incomplete. [5] Includes New York State Barge Canal vessels, not separable.

TABLE NO. 21.—*Statement of commerce through both American and Canadian in*

Year	Date of opening canal	Date of closing canal	Class and tonnage of vessels					Passenger and freight traffic			
			Passages by—			Total passages	Net registered tonnage	Passengers	Coal	Flour	Wheat
			Steamers	Other registered craft	Unregistered craft						
									Tons	*Barrels*	*Bushels*
1855	June 18	Nov. 23	149	44	------	193	106, 296	8, 295	1, 414	10, 289	----------
1856	May 4	Nov. 28	178	112	------	290	101, 458	7, 992	3, 968	17, 686	----------
1857	May 9	Nov. 30	184	192	------	376	180, 820	6, 650	5, 298	18, 515	----------
1858	Apr. 18	Nov. 20	224	182	------	406	219, 819	9, 230	4, 118	13, 782	----------
1859	May 3	Nov. 28	258	411	------	669	352, 642	-------	8, 884	39, 459	74
1860	May 11	Nov. 26	337	579	------	916	403, 657	-------	----------	50, 250	----------
1861	May 3	Nov. 14	296	242	------	538	276, 639	8, 816	11, 507	22, 743	223
1862	Apr. 27	Nov. 27	295	543	------	838	359, 612	8, 468	11, 346	17, 291	----------
1863	Apr. 28	Nov. 24	305	952	------	1, 257	507, 434	18, 281	7, 805	31, 975	----------
1864	May 2	Dec. 4	366	1, 045	------	1, 411	571, 438	16, 985	11, 282	33, 937	----------
1865	May 1	Dec. 3	395	602	------	997	409, 062	19, 777	----------	34, 985	----------
1866	May 5	Dec. 3	453	555	------	1, 008	458, 530	14, 067	19, 915	33, 603	----------
1867	May 4	Dec. 3	466	839	------	1, 305	556, 899	15, 120	22, 927	28, 345	----------
1868	May 2	Dec. 3	338	817	------	1, 155	432, 563	10, 590	25, 814	27, 372	----------
1869	May 4	Nov. 29	399	939	------	1, 338	524, 885	17, 657	27, 850	32, 007	----------
1870	Apr. 29	Dec. 1	431	1, 397	------	1, 828	690, 826	17, 153	15, 952	33, 548	49, 700
1871	May 8	Nov. 29	573	1, 064	------	1, 637	752, 101	15, 859	46, 798	26, 040	1, 376, 705
1872	May 11	Nov. 26	792	1, 212	------	2, 004	914, 735	25, 830	80, 815	136, 411	567, 134
1873	May 5	Nov. 18	968	1, 519	------	2, 517	1, 204, 446	30, 966	96, 780	172, 692	2, 119, 997
1874	May 12	Dec. 2	901	833	------	1, 734	1, 070, 857	22, 958	61, 124	179, 855	1, 120, 015
1875	May 12	Dec. 2	1, 464	569	------	2, 033	1, 259, 534	19, 685	101, 260	309, 991	1, 213, 788
1876	May 8	Nov. 26	1, 733	684	------	2, 417	1, 541, 676	20, 286	124, 960	390, 577	1, 971, 549
1877	May 2	Nov. 30	1, 050	1, 401	------	2, 451	1, 439, 216	21, 800	91, 575	355, 117	1, 349, 738
1878	Apr. 8	Dec. 3	1, 476	1, 091	------	2, 567	1, 667, 136	20, 394	91, 856	344, 599	1, 872, 940
1879	May 2	Dec. 3	1, 618	1, 403	100	3, 121	1, 677, 071	18, 979	110, 704	451, 154	2, 603, 666
1880	Apr. 28	Nov. 15	1, 735	1, 718	50	3, 503	1, 734, 890	25, 766	170, 501	523, 860	2, 105, 920
1881	May 7	Dec. 5	2, 117	1, 706	181	4, 004	2, 092, 757	24, 671	295, 647	605, 453	3, 456, 965
1882	Apr. 21	Dec. 3	2, 739	1, 663	372	4, 774	2, 468, 088	29, 256	430, 184	344, 044	3, 728, 856
1883	May 2	Dec. 11	2, 620	1, 458	237	4, 315	2, 042, 259	39, 130	714, 444	687, 031	5, 900, 473
1884	Apr. 23	Dec. 10	3, 609	1, 709	371	5, 689	2, 997, 837	54, 214	706, 379	1, 248, 243	11, 985, 791
1885	May 6	Dec. 2	3, 354	1, 689	337	5, 380	3, 035, 937	36, 147	894, 991	1, 440, 003	15, 274, 213
1886	Apr. 25	Dec. 4	4, 584	2, 534	306	7, 424	4, 219, 397	27, 088	1, 009, 999	1, 759, 365	18, 991, 485
1887	May 1	Dec. 2	5, 968	2, 562	825	9, 355	4, 897, 598	32, 668	1, 352, 987	1, 572, 735	23, 096, 520
1888	May 7	Dec. 4	5, 305	2, 009	489	7, 803	5, 130, 659	25, 558	2, 105, 041	2, 190, 725	18, 596, 351
1889	Apr. 15	Dec. 4	6, 501	2, 635	443	9, 579	7, 221, 935	25, 712	1, 629, 197	2, 228, 707	16, 231, 854
1890	Apr. 20	Dec. 3	7, 268	2, 872	417	10, 557	8, 454, 435	24, 856	2, 176, 925	3, 239, 104	16, 217, 370
1891	Apr. 27	Dec. 7	7, 339	2, 405	447	10, 191	8, 400, 685	26, 190	2, 507, 532	3, 780, 143	38, 816, 570
1892	Apr. 18	Dec. 6	8, 737	3, 324	519	12, 580	10, 647, 203	25, 896	2, 904, 266	5, 418, 135	40, 994, 780
1893	May 1	Dec. 5	8, 379	2, 955	674	12, 008	8, 949, 754	18, 869	3, 008, 120	7, 420, 674	43, 481, 652
1894	Apr. 17	Dec. 6	10, 208	3, 676	607	14, 491	13, 110, 366	27, 236	2, 797, 184	8, 965, 773	34, 869, 483
1895	Apr. 25	Dec. 11	12, 495	4, 790	671	17, 956	16, 806, 781	31, 656	2, 574, 362	8, 902, 302	46, 218, 250
1896	Apr. 21	Dec. 8	13, 404	4, 391	820	18, 615	17, 249, 418	37, 066	3, 023, 340	8, 882, 858	63, 256, 463
1897	Apr. 21	Dec. 14	12, 029	4, 438	704	17, 171	17, 619, 933	40, 213	3, 039, 172	8, 921, 143	55, 924, 302
1898	Apr. 11	Dec. 14	12, 461	4, 449	851	17, 761	18, 622, 754	43, 426	3, 776, 450	7, 778, 043	62, 339, 996
1899	Apr. 26	Dec. 20	14, 378	4, 776	1, 101	20, 255	21, 958, 347	49, 082	3, 940, 887	7, 114, 147	58, 397, 335
1900	Apr. 19	Dec. 16	14, 426	4, 004	1, 022	19, 452	22, 315, 834	58, 555	4, 486, 977	6, 760, 688	40, 489, 302
1901	Apr. 20	Dec. 21	14, 372	4, 482	1, 187	20, 041	24, 626, 976	59, 663	4, 593, 136	7, 634, 350	52, 812, 636
1902	Apr. 1	Dec. 20	17, 069	4, 368	1, 222	22, 659	31, 955, 582	59, 377	4, 812, 478	8, 910, 240	76, 730, 965
1903	Apr. 2	Dec. 15	14, 027	3, 569	1, 000	18, 596	27, 736, 444	55, 175	6, 937, 633	7, 093, 380	61, 384, 552
1904	Apr. 30	Dec. 26	12, 188	2, 994	938	16, 120	24, 364, 138	37, 695	6, 454, 869	4, 710, 538	49, 928, 869
1905	Apr. 10	Dec. 20	17, 197	3, 263	1, 219	21, 679	36, 617, 699	54, 204	6, 509, 056	5, 772, 719	68, 321, 288
1906	Apr. 13	Dec. 22	18, 138	2, 817	1, 200	22, 155	41, 098, 324	63, 033	8, 739, 630	6, 495, 350	84, 271, 358
1907	Apr. 22	Dec. 15	17, 245	2, 303	889	20, 437	44, 087, 974	62, 758	11, 400, 095	6, 524, 770	98, 135, 775
1908	Apr. 21	Dec. 15	12, 553	1, 355	1, 273	15, 181	31, 091, 730	53, 287	9, 902, 460	5, 704, 375	106, 041, 873
1909	Apr. 20	Dec. 16	16, 463	1, 787	954	19, 204	46, 751, 717	59, 948	9, 940, 026	7, 094, 175	113, 253, 561
1910	Apr. 12	Dec. 15	17, 674	1, 890	1, 335	20, 899	49, 856, 123	66, 933	13, 513, 727	7, 576, 789	86, 259, 974
1911	Apr. 22	Dec. 16	15, 160	1, 681	1, 832	18, 673	41, 653, 488	79, 951	15, 332, 876	7, 246, 495	97, 141, 911
1912	Apr. 24	Dec. 19	19, 076	1, 805	1, 897	22, 778	56, 736, 807	66, 877	14, 931, 594	8, 652, 153	174, 086, 456
1913	Apr. 14	Dec. 18	19, 789	1, 992	2, 014	23, 795	57, 989, 715	77, 194	18, 622, 938	10, 212, 667	204, 821, 507
1914	Apr. 20	Dec. 17	14, 994	1, 682	2, 041	18, 717	41, 986, 339	59, 801	14, 487, 221	9, 715, 085	150, 284, 095
1915	Apr. 13	Dec. 20	17, 699	1, 884	1, 650	21, 233	56, 399, 147	50, 336	13, 357, 058	8, 436, 937	255, 481, 558
1916	Apr. 18	Dec. 19	21, 606	2, 461	1, 340	25, 407	69, 824, 463	54, 922	16, 123, 119	10, 239, 841	226, 063, 315
1917	Apr. 24	Dec. 17	19, 569	1, 943	1, 373	22, 885	65, 307, 233	38, 339	18, 298, 853	8, 449, 949	185, 899, 449
1918	Apr. 20	Dec. 17	17, 067	1, 634	1, 909	20, 610	61, 100, 244	34, 990	17, 981, 610	8, 228, 844	122, 718, 146
1919	Apr. 10	Dec. 15	14, 866	1, 218	1, 503	17, 587	50, 089, 090	56, 992	13, 874, 951	8, 087, 554	113, 734, 848
1920	Apr. 19	Dec. 26	16, 336	1, 354	1, 157	18, 847	58, 194, 083	68, 451	14, 156, 259	7, 477, 533	143, 456, 487
1921	Apr. 7	Dec. 24	10, 779	538	1, 530	12, 847	32, 184, 240	66, 621	14, 763, 155	10, 217, 305	197, 715, 010
1922	Apr. 17	Dec. 24	15, 448	818	1, 117	17, 383	52, 595, 857	59, 043	9, 461, 018	9, 382, 613	275, 615, 288
1923	May 1	Dec. 26	19, 743	1, 327	905	21, 975	68, 546, 412	56, 384	18, 395, 311	10, 485, 521	282, 985, 776
1924	Apr. 19	Dec. 19	16, 064	969	833	17, 866	57, 290, 232	53, 776	13, 565, 953	10, 996, 101	289, 722, 607
1925	Apr. 8	Dec. 17	18, 718	1, 091	841	20, 650	69, 239, 520	56, 956	12, 874, 336	9, 289, 320	292, 817, 942
1926	Apr. 29	Dec. 18	18, 949	1, 324	625	20, 898	71, 290, 862	52, 704	14, 439, 101	9, 797, 310	271, 997, 488
1927	Apr. 12	Dec. 18	17, 096	973	690	18, 759	64, 325, 362	55, 115	17, 107, 500	9, 383, 440	330, 898, 158
1928	May 1	Dec. 16	17, 757	1, 042	487	19, 286	66, 835, 763	56, 053	14, 869, 907	9, 282, 938	406, 759, 712

canals at Sault Ste. Marie, Michigan and Ontario, for each year from first opening 1855

Passenger and freight traffic—Continued										
Grain (other than wheat)	Manufactured and pig iron	Salt	Copper	Iron ore	Lumber	Silver ore and bullion	Stone	General merchandise	Total freight	Year
Bushels	*Tons*	*Tons*	*Tons*	*Tons*	*M ft.b.m.*	*Tons*	*Tons*	*Tons*	*Tons*	
----------	1,445	29	3,196	1,447	127	--------	--------	5,690	14,503	1855
82,060	2,272	154	5,977	11,597	433	--------	--------	5,538	33,817	1856
40,637	4,426	168	4,400	26,185	680	--------	--------	7,140	51,607	1857
21,000	3,031	183	6,944	31,035	188	--------	--------	9,587	57,002	1858
71,738	7,172	411	7,269	65,769	766	--------	--------	25,280	122,056	1859
133,437	1,446	--------	9,000	120,000	----------	--------	--------	14,915	153,721	1860
76,830	4,904	452	7,645	44,837	664	--------	--------	12,972	87,847	1861
59,062	7,023	372	6,881	113,014	240	--------	--------	19,355	161,675	1862
78,480	7,939	226	1,044	181,567	1,414	--------	--------	30,213	236,780	1863
143,560	9,234	266	5,331	213,753	2,012	--------	--------	33,477	284,350	1864
----------	7,400	476	9,935	147,459	822	--------	--------	11,226	181,638	1965
229,926	14,484	668	9,550	152,102	660	--------	--------	32,310	239,457	1866
249,031	23,141	797	10,585	222,861	1,177	--------	--------	33,632	325,357	1867
285,123	23,991	694	12,222	191,939	1,404	--------	--------	31,843	299,175	1868
323,501	25,604	887	18,662	239,368	1,423	--------	--------	41,813	368,326	1869
304,077	42,049	1,663	11,301	409,850	814	92	4,560	40,342	539,883	1870
308,823	57,216	5,430	14,562	327,461	1,098	464	5,528	74,227	585,583	1871
445,774	100,293	6,404	14,986	383,105	1,853	306	5,213	109,663	746,258	1872
309,645	47,996	4,400	15,947	504,121	2,191	580	2,218	123,398	888,432	1873
149,999	33,713	6,635	15,345	427,658	686	443	401	55,312	655,138	1874
272,580	56,649	6,598	18,396	493,408	4,498	847	2,978	70,128	833,465	1875
424,468	67,409	7,000	25,756	609,752	17,820	985	2,102	91,119	1,073,570	1876
378,063	42,705	9,478	16,767	568,082	15,373	1,020	2,506	64,201	912,639	1877
264,674	18,116	9,528	22,529	555,750	34,889	768	2,754	69,007	937,351	1878
973,948	43,771	13,837	22,309	540,075	43,439	324	2,226	81,279	1,050,784	1879
2,553,436	54,302	11,687	21,753	677,073	48,635	66	2,283	100,849	1,321,906	1880
367,838	87,830	9,885	29,488	748,131	58,877	--------	1,400	129,031	1,567,741	1881
473,129	92,870	26,492	25,409	987,060	82,783	22	5,428	172,167	2,029,521	1882
776,552	109,910	10,635	31,024	791,732	87,131	814	2,405	191,571	2,267,105	1883
517,103	72,428	21,721	36,062	1,136,071	122,389	9,731	6,047	207,173	2,874,557	1884
422,981	60,842	20,453	31,927	1,235,122	127,984	3,669	8,189	184,963	3,256,628	1885
715,373	115,208	23,802	38,627	2,087,809	138,688	2,009	9,449	230,726	4,527,759	1886
775,166	74,919	30,736	34,886	2,497,713	165,226	350	13,401	344,586	5,494,649	1887
2,022,308	63,703	31,565	28,960	2,570,517	240,372	3,385	33,541	345,854	6,411,423	1888
2,133,245	57,561	25,238	33,456	4,095,855	315,554	5,947	33,538	312,410	7,516,022	1889
2,044,384	116,327	26,915	43,729	4,774,768	361,929	3,432	47,973	371,294	9,041,213	1890
1,032,104	69,741	35,179	69,190	3,560,213	366,305	1,731	44,080	417,093	8,888,759	1891
1,666,690	101,520	41,361	64,993	4,901,132	512,844	1,930	39,698	459,146	11,214,333	1892
2,405,344	89,452	34,310	87,530	4,014,556	588,545	2,470	19,426	415,180	10,796,572	1893
1,545,008	60,659	35,619	99,573	6,548,876	722,788	412	21,417	451,185	13,195,860	1894
8,328,694	100,337	40,439	107,452	8,062,209	740,700	100	23,876	463,308	15,062,580	1895
27,448,071	121,872	35,533	116,872	7,909,250	684,986	240	17,731	520,851	16,239,061	1896
24,889,688	135,164	42,701	122,324	10,633,715	805,612	5	6,249	579,048	18,982,755	1897
26,078,384	250,170	45,021	124,226	11,706,960	895,485	--------	4,670	623,146	21,234,664	1898
30,000,935	214,585	47,130	120,090	15,328,240	1,038,057	487	39,063	587,484	25,255,810	1899
16,174,659	135,585	49,259	131,066	16,443,568	909,651	110	48,902	541,397	25,643,073	1900
24,760,547	206,443	66,181	98,601	18,090,618	1,072,124	--------	46,584	558,041	28,403,065	1901
27,740,822	198,152	65,354	120,612	24,277,555	1,091,471	1	38,919	740,100	35,961,146	1902
32,095,646	193,267	67,223	112,877	21,654,898	1,003,192	--------	21,300	659,839	34,674,437	1903
33,030,992	229,985	54,193	109,605	19,635,797	923,280	1,356	27,093	732,009	31,546,106	1904
39,229,553	237,696	62,461	106,520	31,332,637	966,806	41	10,899	836,583	44,270,680	1905
54,343,155	391,105	70,920	107,633	35,357,042	900,631	--------	6,222	1,134,851	51,751,080	1906
43,463,338	307,941	68,626	89,959	39,594,944	649,320	--------	898	1,022,654	58,217,214	1907
43,458,583	289,308	81,337	101,735	24,650,340	453,761	--------	1,019	842,901	41,390,557	1908
46,519,451	522,281	96,303	127,212	40,014,978	552,380	--------	1,784	1,140,344	57,895,149	1909
39,245,485	444,669	78,448	148,070	41,603,634	603,101	--------	9,635	1,411,549	62,363,218	1910
40,782,609	412,269	98,229	132,481	30,731,235	558,513		5,342	1,385,918	53,477,216	1911
69,024,546	654,892	98,415	116,954	46,303,423	667,542	Oil	2,282	1,664,783	72,472,676	1912
112,230,369	402,912	108,997	85,378	48,109,353	599,586		6,181	1,770,860	79,718,344	1913
68,338,072	239,683	115,864	91,764	31,413,765	452,148		--------	1,317,304	55,369,934	1914
64,786,870	211,781	104,572	156,436	45,213,604	456,451	*Tons*	--------	1,595,398	71,290,304	1915
93,189,561	202,194	109,000	126,043	63,452,107	341,352	227,679	517,476	903,865	91,888,219	1916
67,415,795	102,082	84,656	118,812	61,374,090	350,609	262,489	571,001	658,365	89,813,898	1917
30,800,621	38,767	81,007	86,078	60,551,296	296,919	334,134	402,009	494,437	85,680,327	1918
52,734,345	117,713	93,893	58,409	46,922,792	244,426	387,023	371,170	542,178	68,235,542	1919
51,630,135	76,194	99,208	51,545	56,780,498	192,854	353,489	563,271	556,110	79,282,496	1920
95,694,264	39,035	62,313	31,533	22,595,323	206,306	301,633	493,447	600,163	48,259,254	1921
119,225,398	68,500	73,685	57,941	42,227,338	214,112	191,182	656,763	880,689	66,067,258	1922
87,523,341	99,462	70,465	60,082	59,356,943	189,337	171,641	697,255	657,495	91,379,658	1923
165,476,906	109,663	62,496	58,308	42,492,197	273,943	172,782	791,219	623,356	72,037,390	1924
149,927,317	147,452	58,036	63,494	53,874,364	186,486	222,575	667,033	707,141	81,875,108	1925
100,269,792	215,713	59,748	58,715	57,649,402	173,075	252,912	581,945	717,679	85,679,087	1926
119,519,549	194,274	59,181	67,422	50,098,068	152,608	256,765	657,878	802,646	83,354,064	1927
131,039,303	303,478	60,808	85,525	53,321,452	187,205	321,098	628,311	868,140	86,992,997	1928

COMMERCE ON ST. MARY'S FALLS CANAL, MICH.

TABLE NO. 22.—*Comparative statement of traffic*

Year	Tons	Value	Passengers	Year	Tons	Value	Passengers
1920	79, 282, 496	$1, 119, 774, 214	68, 451	1925	81, 875, 108	$1, 117, 817, 292	56, 956
1921	48, 259, 254	746, 134, 195	66, 621	1926	85, 679, 087	1, 063, 875, 987	52, 704
1922	66, 067, 258	957, 126, 634	59, 043	1927	83, 354, 064	1, 131, 653, 155	55, 115
1923	91, 379, 658	1, 026, 045, 064	56, 384	1928	86, 992, 997	1, 183, 123, 800	56, 053
1924	72, 037, 390	1, 079, 675, 776	53, 776				

Freight traffic, 1928

DOMESTIC

EASTBOUND

	Short tons
Vegetable food products:	
Wheat	12, 202, 792
Barley	1, 576, 529
Corn	11, 456
Oats	519, 663
Rye	635, 957
Flour	928, 294
Flaxseed	290, 022
Wood and paper: Lumber	369, 565
Nonmetallic minerals: Stone, gravel, and sand	66, 986
Ores, metals, and manufactures of:	
Iron ore	53, 225, 102
Pig iron	117, 544
Copper	85, 525
Unclassified: General merchandise	136, 466
Total	70, 165, 901

Value, $926, 347,226.

WESTBOUND

	Short tons
Nonmetallic minerals:	
Coal, hard	826, 318
Coal, soft	14, 043, 589
Oil	321, 098
Stone	561, 325
Salt	60, 808
Ores, metals, and manufactures of:	
Iron ore	96, 350
Manufactured iron and steel	185, 934
Unclassified: General merchandise	731, 674
Total	16, 827, 096

Value, $256,776,574.

Grand total	86, 992, 997

Total value, $1,183,123,800.

LAKE ST. CLAIR AND THE DETROIT RIVER

No record has been kept of the traffic through the St. Clair Flats Canal or the Detroit River, but estimates have been made by comparing this traffic with that passing through St. Mary's Falls Canal, where records of both net registered and actual freight are kept. During the season of 1928 the freight passing through St. Mary's Falls Canal was 30.16 per cent greater than the net registered tonnage. Since about three-fourths of the Detroit River tonnage is St. Mary's Falls Canal tonnage, there is little error in assuming that the ratio of this three-fourths is the same for the Detroit River as for the St. Mary's Falls Canal. The same applies to the St. Clair Flats Canal.

The following tables show the commerce of the Detroit River and the St. Clair Flats Canal for 1891 and from 1898 to 1928, inclusive:

ST. CLAIR FLATS CANAL, MICH.

TABLE NO. 23.—*Comparative statement of traffic*

Year	Tons	Value	Year	Tons	Value
1891	22,160,000	(1)	1913	78,857,492	$856,392,403
1898	35,000,000	(1)	1914	63,799,286	731,139,818
1899	40,000,000	(1)	1915	76,990,239	953,139,159
1900	42,000,000	(1)	1916	95,370,752	1,010,929,971
1901	48,000,000	(1)	1917	88,738,438	1,182,883,379
1902	41,773,998	(1)	1918	82,979,184	955,920,199
1903	42,000,000	(1)	1919	50,630,434	924,045,923
1904	38,044,929	$403,276,247	1920	75,602,648	1,067,509,390
1905	51,359,071	483,802,449	1921	57,523,481	889,313,016
1906	60,589,441	629,524,292	1922	63,772,660	924,065,843
1907	66,271,962	648,802,508	1923	86,263,197	968,735,702
1908	50,586,560	(1)	1924	75,443,480	1,130,897,765
1909	62,895,134	(1)	1925	84,976,467	1,159,928,775
1910	68,965,947	723,452,784	1926	87,339,635	1,084,758,267
1911	61,498,884	684,482,579	1927	89,166,999	1,210,887,846
1912	72,871,432	795,756,037	1928	90,649,279	1,232,830,194

[1] No statistics available.

DETROIT RIVER, MICH.

TABLE NO. 24

Year	Tons	Value	Year	Tons	Value
1891	23,209,619	(1)	1910	73,526,602	$771,294,055
1892	26,553,819	(1)	1911	66,951,231	745,167,201
1893	23,091,889	(1)	1912	78,671,208	859,089,591
1894	24,263,868	(1)	1913	85,376,705	927,191,016
1895	25,845,679	(1)	1914	69,810,853	800,032,375
1896	27,900,520	(1)	1915	82,514,457	1,021,528,978
1897	35,000,000	(1)	1916	100,907,279	1,069,617,157
1898	35,000,000	(1)	1917	95,243,119	1,269,590,776
1899	40,000,000	(1)	1918	88,855,520	1,023,615,590
1900	42,000,000	(1)	1919	73,091,328	979,423,795
1901	48,000,000	(1)	1920	80,410,082	1,135,390,357
1902	44,260,506	$440,834,640	1921	63,973,308	989,027,342
1903	46,817,245	471,917,830	1922	68,497,062	992,522,428
1904	42,792,326	453,598,656	1923	92,170,460	1,035,074,266
1905	55,508,360	522,888,751	1924	80,073,850	1,200,307,011
1906	63,808,571	662,971,053	1925	90,400,529	1,233,967,221
1907	71,226,895	697,311,302	1926	95,003,604	1,179,944,762
1908	54,086,750	614,425,480	1927	97,188,281	1,319,816,856
1909	67,789,369	732,803,079	1928	100,219,634	1,362,987,022

[1] No statistics available.

WELLAND CANAL TRAFFIC

The traffic on the Welland Canal, according to the statistics compiled by the Dominion of Canada, has increased from 719,360 tons in 1900 to 7,439,617 tons in 1928. The tonnage of the latter year was greater than that of any previous year. It consisted mainly of grain, of which there were 5,294,426 tons. Coal was the next largest item, being 538,879 tons. Of the total tonnage for 1928, 6,469,884 tons were downbound, and 969,733 tons were upbound. In 1928, 5,178,605 tons of the total originated in Canada and 2,261,012 tons in the United States.

The following tables are from the canal statistics published by the Canadian Government:

TABLE NO. 25.—*Traffic on the Welland Canal, 1900–1928*

Year	Canadian vessels		United States vessels		Total number	Vessel tonnage	Freight carried—				
							Originating in Canada		Originating in United States		Total tons
	Number	Tonnage	Number	Tonnage			Tons	Per cent of total	Tons	Per cent of total	
1900	1,765	575,381	634	437,431	2,399	1,012,812					719,360
1901	1,101	413,597	446	391,983	1,547	805,580					620,209
1902	1,011	339,357	557	432,366	1,568	825,723					665,387
1903	955	465,296	832	571,700	1,787	1,036,996					1,002,919
1904	799	435,049	634	416,964	1,433	852,013					811,371
1905	768	479,389	827	622,106	1,595	1,101,495					1,092,050
1906	866	602,876	670	647,152	1,536	1,250,028					1,201,967
1907	1,127	753,713	855	830,000	1,982	1,583,713					1,614,132
1908	1,531	992,237	820	670,934	2,351	1,663,171	776,245	45.57	927,208	54.43	1,703,453
1909	1,724	1,185,974	709	677,884	2,433	1,863,858	1,050,241	51.84	975,710	48.16	2,025,951
1910	1,852	1,461,499	692	687,018	2,544	2,148,517	1,196,946	41.45	1,129,344	48.55	2,326,290
1911	1,664	1,541,548	816	755,631	2,480	2,297,179	1,296,480	51.09	1,241,149	48.91	2,537,629
1912	1,946	1,814,965	959	864,535	2,905	2,679,500	1,553,116	54.46	1,298,799	45.54	2,851,915
1913	2,411	2,376,778	818	787,752	3,229	3,164,530	2,093,406	58.63	1,477,308	41.37	3,570,714
1914	2,902	2,878,483	790	757,212	3,692	3,635,695	2,013,619	52.15	1,847,350	47.85	3,860,969
1915	2,126	2,032,348	796	822,847	2,922	2,855,195	1,426,256	46.59	1,634,756	53.41	3,061,012
1916	2,092	1,794,722	847	718,897	2,939	2,513,619	1,054,480	41.43	1,490,484	58.57	2,544,964
1917	2,554	2,284,873	697	491,388	3,251	2,776,261	981,914	39.43	1,508,628	60.57	2,490,542
1918	2,088	1,760,301	1,104	835,088	3,192	2,595,389	495,607	22.79	1,678,691	77.21	2,174,298
1919	2,344	1,924,419	869	691,595	3,213	2,616,014	1,079,087	49.71	1,091,692	50.29	2,170,779
1920	2,430	2,013,817	694	514,439	3,124	2,528,256	717,452	31.52	1,558,620	68.48	2,276,072
1921	3,038	2,761,228	732	568,143	3,770	3,329,371	1,036,410	33.69	2,040,012	66.31	3,076,422
1922	3,088	2,867,768	813	677,967	3,901	3,545,735	1,802,605	53.15	1,588,814	46.85	3,391,419
1923	4,149	3,429,604	613	422,579	4,762	3,852,183	2,332,309	62.10	1,423,603	37.90	3,755,912
1924	4,654	4,359,552	707	856,959	5,361	5,016,511	3,148,417	62.51	1,888,995	37.49	5,037,412
1925	5,014	4,732,951	852	834,185	5,866	5,567,136	3,387,065	60.05	2,253,233	39.95	5,640,298
1926	4,741	4,340,398	787	712,648	5,528	5,053,046	3,457,876	66.31	1,756,638	33.69	5,214,514
1927	6,504	5,811,180	1,150	1,639,471	7,654	6,850,597	4,448,524	61.38	2,798,935	38.62	7,247,459
1928	5,365	5,598,493	1,222	1,051,464	6,587	6,649,957	5,178,605	69.61	2,261,012	30.39	7,439,617

TABLE NO. 26.—*Statement of traffic on the Welland Canal during 1928*

[Vessels, net registered tonnage; cargoes in tons of 2,000 pounds]

Vessels and commodities	Total number of vessels	From Canadian to Canadian ports		From Canadian to United States ports		From United States to United States ports	
		Up	Down	Up	Down	Up	Down
VESSELS							
Canadian, steam	5,283	453,247	1,745,414	82,095	796		
Canadian, sail	82	1,701	1,395	421			
United States, steam	1,180			64,892	6,461	65,410	82,500
United States, sail	42					840	2,231
Total	6,587	454,948	1,746,809	148,408	7,257	66,250	84,731
COMMODITIES							
Agricultural products:							
Barley			424,144				1,584
Corn		9,180	682				
Oats			294,243			592	9,651
Rye			175,030				6,176
Flax			25,196				
Wheat			2,094,330		14,540		58,443
Flour			18,766		1,593		
Other mill products			1,908	2,006			
Total		9,180	3,034,299	2,006	16,133	592	75,854

TABLE No. 26.—*Statement of traffic on the Welland Canal during 1928*—Con.

[Vessels, net registered tonnage; cargoes in tons of 2,000 pounds]

Vessels and commodities	Total number of vessels	From Canadian to Canadian ports		From Canadian to United States ports		From United States to United States ports	
		Up	Down	Up	Down	Up	Down
COMMODITIES—continued							
Manufactures:							
Agricultural implements		16,574		700			
Cement, bricks, lime		733					
Iron, pig and bloom		3,960	19,634	2,500		9,057	
Iron and steel, all other		90,827	13,443	6,400		4,139	499
Petroleum and other oils		29,163	62,263	10,350			
Sugar		41,967	24,857	5,400		47,988	
Salt			100				
Wines, liquors and beers		1,547	5	3			
Merchandise, miscellaneous		142,384	15,187	58,046	7	25,671	20,613
Total		327,155	135,489	83,399	7	86,855	21,112
Products of forests:							
Pulpwood		217,554		111,186			
Sawed lumber		2,760		2,200			6
Total		220,314		113,386			6
Products of mines:							
Hard coal		2,250					
Soft coal							4,100
Coke							
Copper ore		9,124	5,736				
Iron ore		57,252		1,500			
Other ore		15,080	784	1,850			
Sand, etc		11,370	235,510	80		16,989	
Total		97,076	242,030	3,430		16,989	4,100
Grand total		651,725	3,411,818	202,221	16,140	104,436	101,072

Vessels and commodities	From United States to Canadian ports		Total tons			Origin of cargo	
	Up	Down	Up	Down	Up and down	Canada	United States
VESSELS						*Tons*	*Tons*
Canadian, steam	1,152	1,021,937	2,758,552	2,816.312	5,574,864		
Canadian, sail			13,600	10,029	23,629		
United States, steam	5,028	409,214	532,386	502,487	1,034,873		
United States, sail		3,195	10,028	6,563	16,591		
Total	6,180	1,434,346	3,314,566	3,335,391	6,649,957		
COMMODITIES							
Agricultural products:							
Barley		176,210		601,938	601,938	216,411	385,527
Corn		46,689	9,180	47,371	56,551	1,602	54,949
Oats		23,248	592	327,142	327,734	282,414	45,320
Rye		131,368		312,574	312,574	156,387	156,187
Flax		210		25,406	25,406	25,196	210
Wheat		1,778,637		3,945,950	3,945,950	3,261,711	684,239
Flour				20,359	20,359	20,359	
Other mill products			2.006	1,908	3,914	3,914	
Total		2,156,362	11,778	5,282,648	5,294,426	3,967,994	1,326,432
Manufactures:							
Agricultural implements			17,274		17,274	17,274	
Cement, bricks, lime			733		733	733	
Iron, pig and bloom		2,750	15,517	22,384	37,901	26,094	11,807
Iron and steel, all other		181,186	101,366	195,128	296,494	111,649	184,845
Petroleum and other oils		61,568	39,513	123,831	163,344	98,826	64,518
Sugar	5,835		101,190	24,857	126,047	72,224	53,823
Salt				100	100	100	
Wines, liquors and beers			1,550	5	1,555	1,555	
Merchandise, miscellaneous	3,236	3,534	229,337	39,341	268,678	215,344	53,334
Total	9,071	249,038	506,480	405,646	912,126	543,799	368,327

TABLE NO. 26.—*Statement of traffic on the Welland Canal during 1928*—Continued

[Vessels, net registered tonnage; cargoes in tons of 2,000 pounds]

Vessels and commodities	From United States to Canadian posts		Total tons			Origin of cargo	
	Up	Down	Up	Down	Up and down	Canada	United States
COMMODITIES—continued							
Products of forests:						*Tons*	*Tons*
Pulpwood	----------	----------	328,740	----------	328,740	328,740	----------
Sawed lumber	----------	----------	4,960	6	4,966	4,960	6
Total	----------	----------	333,700	6	333,706	333,700	6
Products of mines:							
Hard coal	----------	4,390	2,250	4,390	6,640	----------	6,640
Soft coal	----------	471,166	----------	475,266	475,266	----------	475,266
Coke	----------	59,223	----------	59,223	59,223	----------	59,223
Copper ore	2,280	475	11,404	6,211	17,615	9,486	8,129
Iron ore	----------	----------	58,752	----------	58,752	58,752	----------
Other ore	----------	200	16,930	984	17,914	17,914	----------
Sand, etc	----------	----------	28,439	235,510	263,949	246,960	16,989
Total	2,280	535,454	117,775	781,584	899,359	333,112	566,247
Grand total	11,351	2,940,854	969,733	6,469,884	7,439,617	5,178,605	2,261,012

Number of pleasure craft through locks in 1928, 85.

NEW YORK STATE BARGE CANAL TRAFFIC

During 1928 there moved by the New York State Barge Canal 3,089,998 short tons of cargo. In addition, 1,080,909 tons were handled at terminals and did not actually pass over the canals. Grain constituted the largest item, while sand, stone and gravel, petroleum, and sulphur were next in order. The traffic of the canal increased steadily from 1,171,296 tons in 1837 to 6,442,225 tons in 1868. The following year, 1869, saw a slight decrease, which was followed by a continuous rise until 1873. Following that year there was a steady drop until 1918, since which time there has been a steady increase.

The following statistics are from the annual report of the superintendent of public works of the State of New York:

TABLE NO. 27.—*Statement of traffic on the New York State Barge Canal*

[In tons]

Year	Erie	Champlain	Oswego	Cayuga and Seneca	Black River	Other canals	Total
1837	667,151	261,659	161,353	20,274	----------	60,859	1,171,296
1838	744,848	266,553	222,697	23,541	----------	75,372	1,333,011
1839	845,007	263,552	221,014	26,300	----------	79,840	1,435,713
1840	829,960	245,229	219,627	32,486	----------	88,744	1,416,046
1841	906,442	276,418	135,689	34,634	----------	168,478	1,521,661
1842	712,310	230,844	129,498	31,716	----------	132,563	1,236,931
1843	819,216	262,212	240,571	25,998	----------	191,887	1,513,844
1844	945,944	269,546	326,607	31,099	----------	243,390	1,816,586
1845	1,038,700	266,922	340,481	46,464	----------	284,998	1,977,565
1846	1,264,408	280,480	351,511	61,014	----------	311,249	2,268,662
1847	1,661,575	313,124	441,096	58,204	----------	395,811	2,869,810
1848	1,599,965	293,889	490,147	46,252	----------	365,977	2,796,230
1849	1,622,444	321,345	557,637	40,440	----------	352,866	2,894,732
1850	1,635,089	460,219	583,346	42,379	----------	355,584	3,076,617
1851	1,955,265	513,793	676,312	37,084	25,320	374,950	3,582,733
1852	2,129,334	531,001	684,191	47,275	36,497	435,143	3,863,441
1853	2,196,308	608,354	761,276	58,793	41,924	581,198	4,247,853
1854	2,224,008	602,913	611,533	72,995	55,525	598,888	4,165,862

TABLE NO. 27.—*Statement of traffic on the New York State Barge Canal*—Continued

[In tons]

Year	Erie	Champlain	Oswego	Cayuga and Seneca	Black River	Other canals	Total
1855	2,202,463	537,108	654,399	76,744	51,347	500,556	4,022,617
1856	2,107,678	611,610	657,381	131,907	68,126	539,380	4,116,082
1857	1,566,624	547,236	605,218	120,435	69,135	435,413	3,344,061
1858	1,767,004	608,918	688,960	75,968	62,352	461,990	3,665,192
1859	1,753,954	751,046	612,390	80,602	75,946	507,746	3,781,684
1860	2,253,533	681,157	1,080,076	98,678	70,687	466,083	4,650,214
1861	2,500,782	545,930	852,920	100,992	69,930	437,081	4,507,635
1862	3,204,277	647,318	1,063,413	125,659	85,442	472,676	5,598,785
1863	2,955,302	878,920	992,173	119,704	90,448	521,145	5,557,692
1864	2,535,792	846,790	765,097	185,161	72,519	447,582	4,852,941
1865	2,523,490	815,311	825,649	192,312	73,317	299,575	4,729,654
1866	2,896,027	1,001,493	990,809	368,233	85,908	432,750	5,775,220
1867	2,920,578	1,047.440	940,136	389,704	70,539	319,928	5,688,325
1868	3,346,986	1,120,585	958,444	515,295	79,770	421,145	6,442,225
1869	2,845,072	1,059,334	934,638	533,316	80,550	405,970	5,859,080
1870	3,083,132	1,143,719	917,728	527,728	96,329	405,133	6,173,769
1871	3,580,922	1,099,995	941,858	445,186	89,560	310,367	6,467,888
1872	3,562,560	1,449,528	832,490	386,977	94,776	347,039	6,373,370
1873	3,602,535	1,195,390	655,588	437,382	86,017	387,870	6,364,782
1874	3,097,122	1,268,292	665,408	378,825	77,601	317,340	5,804,588
1875	2,787,226	1,077,746	486,530	224,492	65,993	217,871	4,859,858
1876	2,418,422	910,151	370,330	137,264	67,927	268,035	4,172,129
1877	3,254,367	1,021,782	319,327	247,864	63,286	49,337	4,955,963
1878	3,608,634	1,040,912	257,254	168,201	68,983	27,336	5,171,320
1879	3,820,027	1,012,005	333,713	117,027	79,600	----------	5,362,372
1880	4,608,651	1,200,503	427,863	125,331	75,308	----------	6,437,656
1881	3,598,721	986,079	394,542	99,617	100,233	----------	5,179,192
1882	3,694,364	1,097,343	445,295	123,488	106,933	----------	5,467,423
1883	3,587,102	1,366,358	276,350	134,631	128,656	170,959	5,664,056
1884	3,389,555	1,118,073	265,511	119,990	116,359	----------	5,009,488
1885	3,208,207	1,139,402	213,079	64,125	106,971	----------	4,731,784
1886	3,808,642	1,119,663	186,484	64,995	114,198	----------	5,293,982
1887	3,840,513	1,229,335	176,177	195,933	111,847	----------	5,553,805
1888	3,321,516	1,198,305	134,078	201,237	118,213	----------	4,942,948
1889	3,673,554	1,187,038	170,078	196,138	143,561	----------	5,370,369
1890	3,303,929	1,520,757	225,936	63,419	132,061	----------	5,246,102
1891	3,097,853	1,101,128	161,426	80,954	122,111	----------	4,563,472
1892	2,978,832	1,021,139	90,886	75,669	115,469	----------	4,281,995
1893	3,235,726	848,965	92,634	38,761	115,877	----------	4,331,963
1894	3,144,144	550,279	98,843	33,270	56,024	----------	3,882,560
1895	2,356,084	966,335	64,154	49,050	64,691	----------	3,500,314
1896	2,742,438	802,519	57,245	54,739	57,953	----------	3,714,894
1897	2,584,906	797,637	53,537	110,277	71,447	----------	3,617,804
1898	2,338,020	804,076	47,662	100,342	69,963	----------	3,360,063
1899	2,419,084	1,034,315	49,373	113,476	69,803	----------	3,686,051
1900	2,145,876	972,867	31,742	130,126	65,330	----------	3,345,941
1901	2,257,035	885,641	43,210	166,258	68,469	----------	3,420,613
1902	2,105,876	766,615	143,707	155,152	103,260	----------	3,274,610
1903	2,414,018	801,649	184,434	116,918	98,366	----------	3,615,385
1904	1,945,708	796,468	170,342	140,656	85,373	----------	3,138,547
1905	1,999,824	833,550	178,777	123,927	90,818	----------	3,226,896
1906	2,385,491	740,983	172,228	164,874	77,331	----------	3,540,907
1907	2,415,548	678,506	143,277	112,570	58,013	----------	3,407,914
1908	2,177,443	614,762	92,831	81,029	85,812	----------	3,051,877
1909	2,031,307	732,125	121,717	84,957	146,430	----------	3,116,536
1910	2,023,185	684,027	110,079	80,125	175,996	----------	3,073,412
1911	2,031,735	770,668	113,891	98,854	81,920	----------	3,097,068
1912	1,795,069	590,723	83,580	80,753	55,991	----------	2,606,116
1913	1,788,453	554,892	61,554	149,874	47,262	----------	2,602,035
1914	1,361,764	492,014	55,705	128,698	42,669	----------	2,080,850
1915	1,155,235	503,030	142,312	26,384	31,153	----------	1,858,114
1916	917,689	506,528	135,948	44,421	20,464	----------	1,625,050
1917	675,083	515,754	74,042	17,525	14,821	----------	1,297,225
1918	667,374	434,784	44,661	7,509	4,942	----------	1,159,270
1919	842,164	363,699	15,888	12,252	4,841	----------	1,238,844
1920	891,221	485,598	36,936	3,959	3,720	----------	1,421,434
1921	993,639	236,473	25,889	10,181	4,225	[1] 187,395	1,457,802
1922	1,485,109	335,844	42,591	9,740	150	[1] 387,329	2,260,763
1923	1,626,062	349,229	13,169	17,824	----------	[1] 566,351	2,572,635
1924	1,691,766	311,470	18,254	10,827	----------	[1] 626,357	2,658,674
1925	1,945,466	347,813	17,560	33,174	----------	[1] 862,849	3,206,862
1926	1,935,278	367,251	32,659	34,179	----------	[1] 1,169,475	3,538,842
1927	2,047,774	411,796	89,385	32,937	----------	[1] 1,324,744	3,906,636
1928	2,535,684	415,717	92,045	46,552	----------	[1] 1,080,909	4,170,907

[1] Consists of tonnage passing over the New York, Buffalo, and Hudson River terminals which did not actually enter the canal channel.

TABLE NO. 28.—*Statement of commerce, New York State Barge Canal, for 1928*

[Quantities expressed in short tons]

Commodities	Tonnage	Commodities	Tonnage
Manufactured products:		Products of agriculture—Continued.	
Iron, pig and bloom	152,695	Barley	139,887
Iron or steel articles	22,729	Flour	1,592
Other metals	40,234	Hay	4,257
Petroleum and other oil	415,098	Flaxseed	4,699
Cement and lime	2,320	Fruits and vegetables	1,830
Brick	37,162	All other	1,278
Salt	52,297	Products of the forest:	
Sugar	144,588	Lumber	71,353
Implements, vehicles, and parts	10,120	Wood pulp	18,969
Machinery and tools	432	Pulpwood	46,416
Paper and paper products	36,571	Shingles, lath	4,516
Furniture and household furnishings	5	All other	475
Oil, meal, and cake	897	Products of the ground:	
Fertilizers	80,705	Anthracite coal	66,632
Chemicals, drugs, etc	19,303	Bituminous coal	5,071
All other	32,341	Iron ore	1,288
Miscellaneous products:		Other ores	41,069
Merchandise, n. o. s	50,808	Sand, stone, gravel	350,701
All other	349	Clay	14,911
Products of agriculture:		Sulphur	171,940
Wheat	1,005,424	All other	2,270
Corn	1,867	Total traffic	3,089,998
Rye	34,899		

	Short tons	Value
Bulk freight	2,324,839	$84,885,298
Package freight	765,159	95,742,117
Total	3,089,998	180,627,415

Total ton-miles, 743,144,519.

ST. LAWRENCE CANALS TRAFFIC

Traffic on the St. Lawrence Canals has increased from 1,309,066 tons in 1900 to 8,411,542 tons in 1928. Grain and grain products in 1928 constituted 5,126,757 tons, while coal and other products of mines comprised 1,555,086 tons. Of these commodities, 6,139,402 tons originated in Canada, and 2,272,140 tons in the United States. The downbound traffic amounted to 6,626,954 tons while the upbound tonnage was 1,784,588.

The following tables are from the canal statistics published by the Canadian Government:

TABLE NO. 29.—*Traffic on the St. Lawrence Canals, 1900–1928*

Year	Canadian vessels		United States vessels		Total number	Vessel tonnage	Freight carried—				
							Originating in Canada		Originating in United States		Total tons
	Number	Tonnage	Number	Tonnage			Tons	Per cent of total	Tons	Per cent of total	
1900	8,737	2,033,206	921	105,151	9,658	2,138,357					1,309,066
1901	7,695	1,859,135	1,330	176,187	9,025	2,035,322					1,208,296
1902	7,416	1,690,532	984	151,025	8,400	1,841,557					1,093,133
1903	8,446	2,126,088	1,252	261,125	9,698	2,387,213					1,681,206
1904	7,532	1,858,385	1,146	278,864	8,678	2,137,249					1,427,316
1905	7,784	1,955,385	1,212	412,816	9,996	2,368,201					1,752,855
1906	8,213	2,019,579	1,258	298,118	9,471	2,317,697					1,636,117
1907	8,734	2,362,679	1,352	433,448	10,086	2,796,127					2,100,466
1908	6,598	2,184,280	1,427	516,267	8,025	2,700,547	1,261,551	62.79	747,451	37.21	2,009,102
1909	8,135	2,476,977	1,136	489,232	9,271	2,966,209	1,710,797	70.96	699,832	29.04	2,410,629
1910	8,834	2,910,395	1,392	482,144	10,226	3,392,539	1,973,441	71.48	787,311	28.52	2,760,752
1911	8,367	3,103,957	1,556	918,078	9,923	3,923,035	2,063,861	66.45	1,041,847	33.55	3,105,708
1912	9,201	3,496,502	1,805	846,333	11,006	4,342,835	2,340,143	67.30	1,137,045	32.70	3,477,188
1913	9,845	4,240,399	1,811	961,371	11,656	5,201,770	2,837,019	65.94	1,465,408	34.06	4,302,427
1914	8,982	4,505,235	1,263	776,490	10,245	5,281,725	2,738,649	62.36	1,652,844	37.64	4,391,493
1915	7,099	3,422,991	1,542	841,792	8,641	4,264,783	2,024,755	59.39	1,384,712	40.61	3,409,467
1916	6,647	3,129,072	1,678	1,016,367	8,325	4,145,439	1,581,195	46.95	1,786,869	53.05	3,368,064
1917	7,327	3,511,986	1,374	819,102	8,701	4,331,088	1,370,533	40.42	2,020,611	59.58	3,391,144
1918	5,687	2,839,918	1,610	970,107	7,297	3,810,025	890,940	29.39	2,140,194	70.61	3,031,134
1919	5,882	3,107,773	1,066	769,172	6,948	3,876,945	1,498,322	51.82	1,393,297	48.18	2,891,619
1920	6,145	3,233,029	813	442,250	6,958	3,675,279	1,285,272	41.89	1,782,690	58.11	3,067,962
1921	8,406	3,929,233	804	545,610	9,210	4,484,843	1,547,743	41.45	2,186,322	58.55	3,734,065
1922	10,484	4,453,716	928	614,232	11,412	5,067,948	2,649,585	61.33	1,670,334	38.67	4,319,919
1923	10,948	4,907,502	652	341,423	11,600	5,248,925	2,970,200	65.40	1,571,328	34.60	4,541,528
1924	10,835	5,449,593	703	433,213	11,538	5,882,806	3,731,869	67.41	1,804,505	32.59	5,536,374
1925	11,753	6,062,833	803	567,394	12,556	6,630,227	4,180,478	67.35	2,026,510	32.65	6,206,988
1926	12,671	5,946,289	857	696,124	13,528	6,642,413	4,350,841	71.05	1,772,860	28.95	6,123,701
1927	13,860	7,370,693	1,110	960,201	14,970	8,330,894	5,347,460	67.58	2,565,492	32.42	7,912,952
1928	13,152	7,416,426	1,258	922,377	14,410	8,338,803	6,139,402	72.99	2,272,136	27.01	8,411,538

TABLE NO. 30.—*Statement of traffic on the St. Lawrence Canal during 1928*

[Vessels, net registered tonnage; cargoes in tons of 2,000 pounds]

Vessels, passengers, and commodities	Total number of vessels	From Canadian to Canadian ports		From Canadian to United States ports		From United States to United States ports	
		Up	Down	Up	Down	Up	Down
VESSELS							
Canadian, steam	10,114	910,231	1,865,494	177,257	1,146		
Canadian, sail	3,038	164,563	262,893	148	638		
United States, steam	1,096	974		105,724	6,296	18,727	7,591
United States, sail	162	247		648	8,286		2,231
Total	14,410	1,076,015	2,128,387	283,777	16,366	18,727	9,822
Passengers, number		28,115	57,073	429			
COMMODITIES							
Agricultural products:							
Barley		1	421,433				
Buckwheat			3				
Corn		14,172	6,206	700			
Oats		231	278,194				
Rye			168,710				
Flax			21,940				
Peas		2					
Wheat		2,382	2,052,031	761	14,470		2,585
Flour		529	7,174				
Hay		2,089	2,751				
Other mill products			682	272	2,006		
Fruit and vegetables		225	5,056				
Potatoes		97	388				
Total		20,410	2,964,158	3,467	14,470		2,585

TABLE NO. 30.—*Statement of traffic on the St. Lawrence Canal during 1928*—Con.

[Vessels, net registered tonnage; cargoes in tons of 2,000 pounds]

Vessels, passengers, and commodities	Total number of vessels	From Canadian to Canadian ports		From Canadian to United States ports		From United States to United States ports	
		Up	Down	Up	Down	Up	Down
COMMODITIES—continued							
Animal products:							
Livestock		14	207				
Poultry, game, fish		25	1				
Other packing-house products		301	1,512				
Hides and leather		8	81				
Wool		15	3				
Animal products, all other		2,031	4,677				
Total		2,394	6,481				
Manufactures:							
Agricultural implements		54	252				
Cement, bricks, lime		3,076	457				
Household goods and furniture		381	906				
Iron, pig and bloom		3,393	10,941	2,500		9,046	
Iron and steel, all other		90,425	22,079	4,922		4,590	
Petroleum and other oils		194,296	1,367				
Sugar		86,250	2,090	5,615			
Salt		1,165	136				
Wines, liquors, and beers		6,042	664	60			
Merchandise, not enumerated		162,788	110,450	57,694	6,039	1,382	6,050
Total		547,870	149,342	70,791	6,039	15,018	6,050
Products of forests:							
Pulpwood		282,162	2,760	390,037	2,200	2,340	
Sawed lumber		22,984	41,761	4,679	15,152		
Squared timber		6	10				
Other woods		13	40				
Total		305,165	44,571	394,716	17,352	2,340	
Products of mines:							
Hard coal		7,123	280				
Soft coal		107,157	12,665				
Coke		185	1,843				
Copper ore		5,049	4,761				
Iron ore		56,652		2,108			
Other ore		22,980	984	1,600			
Sand, etc		161,201	364,716			16,989	
Total		360,347	385,249	3,708		16,989	
Grand total		1,236,186	3,549,801	472,682	37,861	34,347	8,635

Vessels, passengers, and commodities	From United States to Canadian ports		Total tons			Origin of cargo	
	Up	Down	Up	Down	Up and down	Canada	United States
VESSELS							
Canadian, steam	3,578	1,080,624	3,282,275	3,236,424	6,518,699		
Canadian, sail		3,042	454,316	443,411	897,727		
United States, steam	13,247	391,379	469,421	427,377	896,788		
United States, sail	5,793	974	12,711	12,868	25,579		
Total	22,618	1,476,019	4,218,723	4,120,080	8,338,803		
Passengers, number		309	28,544	57,382	85,926		
COMMODITIES							
Agricultural products:							
Barley		176,020	1	597,453	597,454	223,496	373,958
Buckwheat				3	3	3	
Corn		41,726	14,872	47,932	62,804	5,094	57,710
Oats		21,464	231	299,658	299,889	266,913	32,976
Rye		125,752		294,462	294,462	145,150	149,312

TABLE NO. 30.—*Statement of traffic on the St. Lawrence Canal during 1928*—Con.

[Vessels, net registered tonnage; cargoes in tons of 2,000 pounds]

Vessels, passengers, and commodities	From United States to Canadian ports		Total tons			Origin of cargo	
	Up	Down	Up	Down	Up and down	Canada	United States
COMMODITIES—continued							
Agricultural products—Con.							
Flax		210		22,150	22,150	21,940	210
Peas			2		2	2	
Wheat		1,764,692	3,143	3,833,778	3,836,921	3,174,859	662,062
Flour			529	7,174	7,703	7,703	
Hay			2,089	2,751	4,840	4,840	
Other mill products			2,688	272	2,960	2,960	
Fruit and vegetables			225	5,056	5,281	5,281	
Potatoes			97	388	485	485	
Total		2,129,864	23,877	5,111,077	5,134,954	3,858,726	1,276,228
Animal products:							
Livestock			14	207	221	221	
Poultry, game, fish			25	1	26	26	
Other packing-house products			301	1,512	1,813	1,813	
Hides and leather			8	81	89	89	
Wool			15	3	18	18	
Animal products, all other			2,031	4,677	6,708	6,708	
Total			2,394	6,481	8,875	8,875	
Manufactures:							
Agricultural implements			54	252	306	306	
Cement, bricks, lime			3,076	457	3,533	3,533	
Household goods and furniture			381	906	1,287	1,287	
Iron, pig and bloom			14,939	10,941	25,880	16,834	9,046
Iron and steel, all other		126,572	99,937	148,651	248,588	116,885	131,703
Petroleum and other oils	1,751		196,047	1,367	197,414	195,871	1,543
Sugar	6,960		98,825	2,090	100,915	93,955	6,960
Salt			1,165	136	1,301	1,301	
Wines, liquors, and beers	1,285		7,387	664	8,051	6,766	1,285
Merchandise, miscellaneous	14,567	1,992	236,431	124,531	360,962	334,914	26,048
Total	24,563	128,564	658,242	289,995	948,237	771,652	176,585
Products of forests:							
Pulpwood			674,539	4,960	679,499	679,499	
Sawed lumber	242		27,905	56,913	84,818	84,576	242
Squared timber			6	10	16	16	
Other woods			13	40	53	53	
Total	242		702,463	61,923	764,386	764,144	242
Products of mines:							
Hard coal	14,025	13,022	21,148	13,302	34,450	5,303	29,147
Soft coal		736,266	107,157	748,931	856,088	114,879	741,209
Coke		21,437	185	23,280	23,465	185	23,280
Copper ore	2,280	1,500	7,329	6,261	13,590	5,647	7,943
Iron ore			58,760		58,760	58,760	
Other ore			24,580	984	25,564	25,564	
Sand, etc	263		178,453	364,716	543,169	526,667	17,502
Total	16,568	772,225	397,612	1,157,474	1,555,086	736,005	819,081
Grand total	41,373	3,030,653	1,784,588	6,626,950	8,411,538	6,139,402	2,272,136

V. THE GRAIN MOVEMENT

POSITION OF THE GREAT LAKES WITH REFERENCE TO GRAIN TRAFFIC

The territory tributary to the Great Lakes is the most important grain producing district in the world. It includes most of the surplus grain producing States of this country and nearly all the grain territory of Canada. In order to make evident the position of the Great Lakes in the national and international grain traffic, data are presented showing world production of the principal grains, the production of the United States and Canada, the production of the States and Provinces tributary to the Great Lakes, the movements to upper lake ports, the movements on the Lakes and to North Atlantic ports, the facilities available for handling grain at the ports, elevator charges, and the rail and water rates in effect on grain from interior shipping points to lake ports and to seaboard.

WORLD GRAIN PRODUCTION

While a detailed analysis of grain production throughout the world is not within the scope of this study, a general knowledge of the total production and of the amounts credited to each of the principal countries contributing to the world's supply of grain is necessary to a proper understanding of the importance of the Great Lakes territory in this trade. Tables showing world production of the principal grains during the period 1912 to 1928, inclusive, have therefore been reproduced from the 1928 Year Book of the Department of Agriculture. This particular period was selected in order to present data for years prior to the World War.

World wheat production.—The figures of the Department of Agriculture show that the production of wheat has increased by approximately 700,000,000 bushels during the period 1912 to 1928. During this period production in the United States increased by 173,000,000 bushels and in Canada by 310,000,000 bushels. In 1912 the United States and Canada produced 30.8 per cent of the world's wheat, excluding that of Russia and China, and in 1928, 38 per cent. Figures for Russia are incomplete, but they indicate a rapidly increasing production in the Union of Socialist Soviet Republics since 1921.

TABLE NO. 31.—*World production of wheat, 1912–1928*

[Quantities in millions of bushels]

Year	World production excluding Russia and China	Northern Hemisphere production excluding Russia and China	European productoin excluding Russia	Selected countries						
				Russia[1]	United States	Canada	India	Argentina	Australia	France
1912 [2]	3,093	2,770	1,284	801	730	224	371	187	92	334
1913 [2]	3,098	2,853	1,301	1,028	763	232	368	105	103	319
1914	2,834	2,601	1,072	[3] 834	891	161	312	169	25	283
1915	3,497	3,102	1,125	[4] 827	1,026	394	377	169	179	223
1916	2,734	2,457	1,049	[5] 531	636	263	323	84	152	205
1917	2,574	2,178	740	622	637	234	382	235	115	[6] 135
1918	2,911	2,608	909	--------	921	189	370	180	76	226
1919	2,821	2,517	899	--------	968	193	280	217	46	182
1920	2,948	2,595	949	320	833	263	378	156	146	237
1921	3,169	2,787	1,216	205	815	301	250	191	129	323
1922	3,225	2,868	1,044	243	868	400	367	196	109	243
1923	3,551	3,119	1,257	249	797	474	372	248	125	276
1924	3,143	2,730	1,051	472	864	262	361	191	165	281
1925	3,435	3,067	1,391	730	676	395	331	191	115	330
1926 [7]	3,420	2,979	1,205	820	831	407	325	221	161	232
1927 [7]	3,605	3,181	1,262	746	878	480	335	239	117	276
1928 [7]	3,780	3,305	1,383	860	903	534	290	--------	154	278

[1] Includes all Russian territory reporting for years named.
[2] The average production for the 1909–1913 period as computed from figures given here for estimated world total, Northern Hemisphere total, European total, and European countries whose boundaries were changed by the World War will not agree with estimates appearing elsewhere for present territory, due to changes in boundary.
[3] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[4] Exclusive of Russian Poland, Lithuania, parts of present Latvia and Ukraine, and 2 Provinces of Transcaucasia.
[5] Beginning with this date estimated production is within present boundaries of the Union of Socialist Soviet Republics, excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924 produced 51,706,000 bushels, and in 1925, 58,000,000 bushels.
[6] Beginning with this date production is within postwar boundaries and therefore not comparable with earlier years.
[7] Preliminary.

Bureau of Agricultural Economics. For each year is shown the production during the calendar year in the Northern Hemisphere and the succeeding harvest in the Southern Hemisphere.

World oats production.—With the exception of the years 1921 and 1927, and the possible exception of 1928, for which the estimate is not yet available, the world's production of oats has exceeded that of wheat since 1912. An increased production of oats is shown for each country listed in 1928 except France. It will be noted that the estimates of world production given do not include Russia. Production of oats within the present boundaries of the Union of Socialist Soviet Republics about equals that of the Russian Empire in pre-war days.

TABLE NO. 32.—*World production of oats, 1912–1928*

[Quantities in millions of bushels]

Year	Estimated world production excluding Russia	Estimated European production excluding Russia	Selected countries							
			United States	Russia[1]	Germany	France	Canada	Poland	England and Wales	Argentina
1912	3,700	1,720	1,418	1,089	587	355	392	----	89	76
1913	3,580	1,909	1,122	1,251	669	357	405	----	91	43
1914	3,266	1,681	1,141	[2] 915	623	318	313	----	93	49
1915	3,594	1,401	1,549	[3] 897	412	339	465	----	101	75
1916	3,259	1,469	1,252	[4] 845	484	277	410	----	102	32
1917	3,217	1,047	1,593	761	[5] 250	[5] 220	403	----	106	69
1918	3,215	1,117	1,538	----	302	181	426	----	140	34
1919	3,040	1,319	1,184	----	310	180	394	76	111	31
1920	3,647	1,478	1,496	486	332	291	531	129	105	51
1921	3,136	1,511	1,078	359	345	244	426	150	98	31
1922	3,384	1,545	1,216	409	277	288	491	176	91	56
1923	3,846	1,810	1,306	405	421	337	564	243	93	76
1924	3,683	1,630	1,503	603	390	306	406	166	105	53
1925	3,848	1,792	1,488	798	385	328	402	228	97	80
1926	3,697	1,921	1,247	988	436	364	383	210	104	66
1927	3,602	1,842	1,183	889	437	343	440	234	94	52
1928 [6]	----	1,956	1,450	1,109	482	336	452	261	101	----

[1] Includes all Russian territory reporting for the years shown.
[2] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[3] Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the provinces of Batum and Elizabetpol, in Transcaucasia.
[4] Beginning this year estimates for the present territory of the Union of Socialist Soviet Republics exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924 produced 20,248,000 bushels.
[5] Beginning with this year postwar boundaries and therefore not comparable with earlier years.
[6] Preliminary.

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. For each year is shown the production during the calendar year in the Northern Hemisphere and the succeeding harvest in the Southern Hemisphere.

World corn production.—During the period under discussion world production of corn has averaged over 4,200,000,000 bushels annually, while the production of the United States has averaged about 2,800,000,000, or approximately two-thirds of the total. Our principal competitor in this trade is Argentina, which produced an average of about 226,000,000 bushels, or approximately 8 per cent of the amount produced by the United States.

TABLE NO. 33.—*World production of corn, 1912–1928*

[Quantities in millions of bushels]

Year	Estimated world production, excluding Russia	Estimated European production, excluding Russia	Selected countries							
			United States	Italy	Rumania	Argentina	Brazil	Yugoslavia	Russia [1]	Canada
1912	4,451	547	3,125	99	104	197	----	----	94	17
1913	3,890	576	2,447	108	115	263	----	----	84	17
1914	4,186	559	2,673	105	103	325	----	----	[2] 90	14
1915	4,352	520	2,995	122	86	161	----	----	[3] 72	14
1916	3,770	389	2,567	82	----	59	204	----	[4] 62	6
1917	4,178	351	3,065	83	----	171	95	----	----	8
1918	3,579	299	2,503	77	31	224	87	----	----	14
1919	4,242	454	2,811	86	[5] 141	259	197	----	----	17
1920	4,689	520	3,209	89	182	230	186	[5] 101	46	14
1921	4,315	394	3,069	92	111	176	181	74	46	15
1922	4,240	425	2,906	77	120	176	202	90	81	14
1923	4,519	468	3,054	89	151	277	180	85	67	14
1924	3,872	589	2,309	106	155	186	162	149	91	12
1925	4,530	626	2,917	110	164	280	162	149	177	11
1926	4,441	665	2,692	118	239	321	139	134	143	8
1927	4,324	479	2,763	84	139	306	160	83	149	4
1928 [6]	----	389	2,840	65	108	----	----	81	----	5

[1] Includes all Russian territory reporting for the years shown.
[2] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[3] Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the Provinces of Batum and Elizabetpol in Transcaucasia.
[4] Beginning this year estimates within present boundaries of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia and the Far East, which territory in 1924 produced 26,048,000 bushels.
[5] Production in present boundaries beginning this year, therefore, not comparable with earlier years.
[6] Preliminary.

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. For each year is shown the production during the calendar year in the Northern Hemisphere and the succeeding harvest in the Southern Hemisphere.

World barley production.—Prior to the World War Russia led all other countries in growing barley, with an average of about 25 per cent of the total. Beginning with 1921, however, the United States has surpassed all other countries in this industry, although the statistics do not indicate a greatly increased output for our country until 1928, when 357,000,000 bushels were produced. Canada, however, has steadily increased her production, and the Canadian barley crop in 1928 was almost three times that of 1912.

TABLE NO. 34.—*World production of barley, 1912–1928*

[Quantities in millions of bushels]

Year	Estimated world production, excluding Russia	Estimated European production, excluding Russia	Selected countries							
			United States	Russia [1]	Germany	Japan	Canada	India	Spain	Rumania
1912	1,345	589	224	496	160	91	49	--------	60	21
1913	1,400	637	178	600	169	101	48	--------	69	27
1914	1,213	546	195	[2] 433	144	86	36	125	72	26
1915	1,244	477	229	[3] 429	114	95	54	143	84	29
1916	1,201	507	182	[4] 305	128	89	43	148	87	30
1917	1,170	427	212	325	[5] 90	89	55	156	78	--------
1918	1,273	420	256	--------	94	88	77	156	90	[5] 5
1919	1,117	479	148	--------	88	89	56	130	82	32
1920	1,249	552	189	216	82	85	63	150	90	68
1921	1,246	567	155	119	89	82	60	117	89	44
1922	1,312	599	182	176	74	81	72	146	78	94
1923	1,428	664	198	196	108	69	77	145	112	61
1924	1,324	577	182	181	110	[6] 75	89	137	84	31
1925	1,503	689	214	279	119	[6] 91	87	123	99	47
1926	1,460	690	185	253	113	[6] 88	100	121	96	77
1927	1,507	679	266	215	126	[6] 82	97	119	92	58
1928 [7]	----------	760	357	262	154	[6] 84	136	--------	82	65

[1] Includes all Russian territory reporting for the years shown.
[2] Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batumin Transcaucasia.
[3] exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and two Provinces of Transcaucasia.
[4] Beginning this year estimates within present boundaries of the Union of Socialist Soviet Republic2 excluding Turkestan, Transcaucasia, and the Far East, woich region in 1924 produced 20,897,000 bushels.
[5] Postwar boundaries beginning this year and therefore comparable with earlier years
Weighed bushels, those reported for the earlier years being measured bushels.
[7] Preliminary.

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. For each year is shown the production during the calendar year in the Northern Hemisphere and the succeed- the succeeding harvest in the Southern Hemisphere.

World rye production.—The figures presented below make apparent Russia's preeminent position in the rye industry, as well as the relatively unimportant positions occupied by the United States and Canada. However, the production of rye in Canada has greatly increased since about 1920. The growing importance of Poland as a rye-producing country is also apparent.

TABLE NO. 35.—*World production of rye, 1912–1928*

[Quantities in millions of bushels]

Year	World production excluding Russia and China	Northern Hemisphere production, excluding Russia and China	European production excluding Russia	Selected countries							
				Russia [1]	United States	Germany	France	Poland	Hungary	Czechoslovakia	Canada
1912 [2]	862	860	810	1,051	36	457	49	----	57	----	2
1913 [2]	892	889	834	1,011	41	481	50	----	56	----	2
1914	766	763	707	[3] 870	43	347	44	----	45	----	2
1915	691	689	621	[4] 910	54	301	33	----	48	----	2
1916	663	661	598	[5] 771	49	287	33	----	----	----	3
1917	548	545	466	614	63	[6] 228	25	----	----	----	4
1918	590	588	476	----	91	250	[6] 29	----	----	----	9
1919	681	679	586	----	75	238	29	103	----	----	10
1920	619	616	533	368	60	194	34	74	[6] 21	33	11
1921	853	850	760	401	62	268	44	168	23	54	21
1922	864	858	716	568	103	206	38	197	25	51	32
1923	925	919	826	549	63	263	37	235	31	53	23
1924	743	739	653	737	65	226	40	144	22	45	14
1925	1,008	1,001	938	878	46	317	44	257	33	58	14
1926 [7]	817	812	752	902	41	252	30	197	31	46	12
1927 [7]	888	879	800	933	58	269	34	224	22	49	15
1928 [7]	965	954	890	783	42	335	35	232	33	53	15

[1] Includes all Russian territory reporting for the years shown.
[2] The average production for the 1909–1913 period as computed from figures given here for estimated world total, Northern Hemisphere total, European total, and European countries whose boundaries were changed by the World War, will not agree with estimates appearing elsewhere for present territory due to changes in boundary.
[3] Exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.
[4] Exclusive of Russian Poland, Lithuania, parts of Latvia and the Ukraine, and the two Provinces of Batum and Elizabetpol in Transcaucasia.
[5] Beginning with this year estimates for the present territory of the Union of Socialist Soviet Republics exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924 produced 8,646,000 bushels.
[6] Beginning with this year postwar boundaries, therefore not comparable with earlier years.
[7] Preliminary.

Bureau of Agricultural Economics. For each year is shown the production during the calendar year in the Northern Hemisphere and the succeeding harvest in the Southern Hemisphere.

World production of flaxseed.—Statistics of the Department of Agriculture indicate that the world production of flaxseed during the period 1921 to 1925 averaged 119,200,000 bushels. The total world production in 1926 amounted to 142,389,000 bushels, and in 1927 to 157,183,000 bushels. The average production of flaxseed in the United States during the 6-year period 1923 to 1928, inclusive, amounted to 22,616,300 bushels, and of Canada to 6,261,000.

World production of all grains.—The importance of the United States and Canada in the grain trade of the world is well indicated by the following table. The total world production, not including Russia and China, averaged 12,874,000,000 bushels per annum for the 16 years for which data are available. During this period production of grain in the United States averaged approximately 5,231,000,000 bushels and that of Canada 823,000,000 bushels. Considering the United States and Canada as a unit, the production of grain in each year has exceeded 40 per cent of the total production

of the world, excluding Russian grain for which complete statistics are not available. It will be noted that the percentage produced in the United States and Canada increased during and immediately after the war period, becoming slightly less after that time.

TABLE No. 36.—*United States and Canadian production of wheat, oats, corn, barley, and rye, compared to world production*

[Quantities in millions of bushels]

Year	United States	Canada	Total United States and Canada	Estimated world totals, excluding Russia and China	Per cent of United States and Canada of world
1912	5,533	684	6,217	13,451	46.2
1913	4,551	704	5,255	12,860	40.9
1914	4,943	526	5,469	11,499	47.6
1915	5,853	929	6,782	13,378	50.7
1916	4,686	725	5,411	11,627	46.5
1917	5,570	704	6,274	11,687	53.8
1918	5,309	715	6,024	11,568	51.9
1919	5,186	670	5,856	11,901	49.2
1920	5,787	882	6,669	13,152	50.7
1921	5,179	823	6,002	12,719	47.2
1922	5,275	1,009	6,284	13,025	48.2
1923	5,418	1,152	6,570	14,269	46.0
1924	4,923	783	5,706	12,765	44.7
1925	5,341	909	6,250	14,324	43.6
1926	4,996	910	5,906	13,835	42.7
1927	5,148	1,036	6,184	13,926	44.4
1928	5,592	1,142	6,734	(1)	----------

[1] Not yet available.

PRODUCTION IN TERRITORY TRIBUTARY TO THE GREAT LAKES

Wheat.—From the standpoint of international trade, wheat is the most important grain produced in the territory served by the Great Lakes. The annual production in the United States is only about 30 per cent that of corn and is considerably less than that of oats, but both the latter grains are consumed largely upon farms and do not enter the channels of trade to the same extent as wheat. Table No. 37 shows the production of wheat in the 16 States tributary to the Great Lakes, compared with total production in the United States, during the 10-year period 1919–1928. Table No. 38 shows the production during this period in the three Prairie Provinces of Alberta, Saskatchewan, and Manitoba, which normally ship largely by way of the Great Lakes. These three Provinces produced 93.3 per cent of the wheat grown in Canada during the period.

TABLE NO. 37.—*Production of wheat in States tributary to the Great Lakes*

[In thousands of bushels]

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	10-year average
Ohio	53, 932	30, 430	30, 185	35, 374	42, 783	33, 446	24, 304	40, 384	29, 068	9, 475	32, 938. 1
Indiana	42, 332	24, 960	24, 192	28, 928	34, 248	28, 972	25, 700	34, 048	27, 749	9, 590	28, 071. 9
Illinois	64, 562	45, 492	46, 822	55, 432	62, 506	37, 988	36, 880	41, 034	34, 844	24, 200	24, 976. 0
Michigan	20, 237	15, 383	14, 840	14, 326	16, 576	20, 132	14, 557	17, 998	19, 270	14, 202	16, 752. 1
Wisconsin	7, 392	5, 152	2, 812	3, 006	1, 970	2, 786	2, 267	2, 599	3, 142	2, 141	3, 326. 7
Minnesota	36, 315	28, 168	22, 938	27, 276	23, 385	37, 863	30, 269	24, 811	20, 925	23, 955	27, 590. 5
Iowa	22, 515	10, 732	9, 944	16, 452	13, 558	9, 142	6, 303	8, 078	8, 236	8, 270	11, 323. 0
Missouri	59, 833	37, 653	34, 952	38, 818	36, 790	21, 388	22, 515	21, 474	15, 700	19, 194	30, 831. 7
North Dakota	55, 200	80, 200	80, 750	126, 618	71, 410	33, 450	112, 378	77, 081	130, 191	142, 923	101, 020. 1
South Dakota	30, 175	26, 920	25, 980	40, 012	27, 515	35, 157	31, 835	11, 611	45, 386	34, 546	30, 913. 7
Nebraska	60, 675	60, 480	59, 875	59, 838	31, 388	58, 519	34, 150	40, 085	73, 826	69, 919	54, 875. 5
Kansas	152, 079	143, 078	128, 695	122, 861	83, 804	159, 964	77, 388	150, 084	111, 327	177, 833	130, 711. 3
Montana	10, 650	28, 690	33, 430	52, 714	47, 708	51, 799	35, 021	44, 744	80, 208	77, 218	46, 218. 2
Wyoming	3, 540	3, 920	3, 316	2, 506	2, 785	2, 141	2, 720	3, 714	4, 186	4, 098	3, 292. 6
Colorado	16, 615	25, 273	23, 239	21, 776	18, 272	19, 520	14, 652	18, 452	20, 112	18, 564	19, 647. 5
Idaho	19, 075	24, 600	26, 952	24, 275	30, 115	16, 059	26, 042	24, 633	32, 374	28, 792	25, 291. 7
Total above 16 States	655, 127	591, 175	568, 922	670, 212	544, 813	668, 326	496, 981	560, 830	656, 544	664, 920	607, 780. 6
Total United States	934, 265	833, 027	814, 905	867, 598	797, 394	864, 428	676, 429	831, 040	878, 374	902, 749	840, 020. 9
Per cent above 16 States of total United States	70. 2	71. 0	69. 8	77. 2	68. 3	77. 3	73. 4	67. 4	74. 7	73. 6	72. 3

TABLE NO. 38.—*Production of wheat in Provinces tributary to Great Lakes*

[In thousands of bushels]

Year	Alberta	Saskatchewan	Manitoba	Total	Total Canada	Per cent of three Provinces of total Canada
1919	34, 575	89, 994	40, 975	165, 544	193, 260	85. 6
1920	83, 461	113, 135	37, 542	234, 138	263, 189	88. 9
1921	53, 044	188, 000	39, 054	280, 098	300, 858	93. 1
1922	64, 976	250, 167	60, 051	375, 194	399, 786	93. 8
1923	144, 834	271, 622	35, 804	452, 260	474, 199	95. 4
1924	61, 312	132, 918	41, 464	235, 694	262, 097	89. 9
1925	97, 962	235, 472	33, 624	367, 058	395, 475	92. 8
1926	113, 986	219, 646	47, 133	380, 765	407, 136	93. 5
1927	171, 286	252, 500	30, 773	454, 559	479, 665	94. 8
1928	171, 000	321, 215	52, 383	544, 598	566, 726	96. 1
Average 10 years	99, 644	207, 467	41, 880	348, 991	374, 239	93. 3

Oats.—During the 10-year period under consideration the average yearly production of oats in the 16 States adjacent to the Great Lakes amounted to 1,074,260,300 bushels, while the average for the three tributary Canadian Provinces amounted to 275,662,000 bushels, making the total average production of the Great Lakes area 1,349,-922,300 bushels. This exceeds the annual average production of wheat in this area by 393,150,700 bushels.

TABLE NO. 39.—*Production of oats in States tributary to the Great Lakes*

[In thousands of bushels]

State	1919	1920	1921	1922	1923	1924
Ohio	47,916	68,068	35,650	39,744	52,302	65,600
Indiana	56,000	76,875	45,888	31,626	48,692	69,375
Illinois	128,730	171,193	121,741	110,010	135,100	170,586
Michigan	37,875	58,806	28,101	50,932	48,896	58,704
Wisconsin	78,423	107,878	63,958	101,558	92,166	103,600
Minnesota	98,728	138,825	99,480	142,746	155,400	197,241
Iowa	192,584	229,866	164,840	217,925	209,019	245,910
Missouri	46,089	58,499	42,960	19,200	34,500	40,750
North Dakota	37,154	60,432	48,792	78,804	54,924	88,944
South Dakota	56,927	75,446	58,300	74,400	78,336	104,858
Nebraska	69,962	83,040	70,054	56,106	81,048	68,768
Kansas	43,667	65,299	38,827	27,639	34,922	34,225
Montana	3,474	11,726	14,832	21,120	22,209	16,225
Wyoming	1,200	4,370	4,500	4,898	5,610	3,750
Colorado	4,559	6,426	6,727	4,625	7,232	5,800
Idaho	5,550	7,030	7,740	6,156	7,820	5,580
Total above 16 States	908,838	1,223,779	852,390	987,489	1,068,176	1,279,916
Total United States	1,184,030	1,496,281	1,078,341	1,215,803	1,305,883	1,502,529
Per cent above 16 States of total United States	76.8	81.8	79.1	81.2	81.7	85.1

State	1925	1926	1927	1928	10-year average
Ohio	83,000	75,240	60,800	89,281	61,760.1
Indiana	59,864	61,500	48,700	93,684	51,220.4
Illinois	157,788	123,516	102,204	174,338	139,520.6
Michigan	51,808	51,810	54,170	58,461	49,956.3
Wisconsin	126,246	96,638	93,247	108,532	97,224.6
Minnesota	200,340	129,162	116,580	153,338	143,184.0
Iowa	243,863	195,867	192,032	240,040	213,194.6
Missouri	49,998	43,460	26,605	44,968	40,702.9
North Dakota	63,558	34,408	45,688	59,954	57,265.8
South Dakota	96,356	23,213	74,715	59,211	70,176.2
Nebraska	73,953	52,516	69,813	78,936	70,419.6
Kansas	39,376	35,122	30,574	37,729	38,738.0
Montana	13,612	16,666	23,840	20,221	16,392.5
Wyoming	4,690	4,200	4,320	4,092	4,163.0
Colorado	5,778	4,680	5,481	5,983	5,729.1
Idaho	8,330	4,760	6,721	6,439	6,612.6
Total above 16 States	1,278,560	952,758	955,490	1,235,207	1,074,260.3
Total United States	1,487,550	1,246,848	1,182,594	1,449,531	1,314,939.0
Per cent above 16 States of total United States	86.0	76.4	80.8	85.3	81.7

TABLE NO. 40.—*Production of oats in Provinces tributary to Great Lakes*

[In thousands of bushels]

Year	Alberta	Saskatchewan	Manitoba	Total	Total Canada	Per cent of three Provinces of total Canada
1919	65,725	112,157	57,698	235,580	394,387	59.7
1920	115,091	141,549	57,657	314,297	530,710	59.2
1921	64,192	170,513	49,442	284,147	426,233	66.7
1922	32,290	200,101	76,379	308,770	491,239	62.8
1923	114,977	218,075	58,704	391,756	563,997	69.5
1924	55,251	97,345	70,729	223,325	405,976	55.0
1925	58,762	102,297	50,107	211,166	402,296	52.5
1926	47,479	110,193	52,778	220,450	383,416	57.5
1927	101,160	142,526	25,767	269,453	439,712	61.3
1928	88,257	156,043	53,376	297,676	452,153	65.8
Average, 10 years	74,318	145,080	55,264	275,662	449,012	61.4

Corn.—The 16 States adjacent to the Great Lakes form the greatest corn-producing district in the world. During the 10-year period these States produced an annual average of 2,019,003,200 bushels of corn, far exceeding the amount of any other grain produced in the same territory, and averaging 70.5 per cent of the total corn production of the United States. The position of the United States with reference to world production of corn is shown by Table No. 33. This table also shows the output of Canada, which is too small to be a factor, and is therefore not shown by Provinces.

TABLE No. 41.—*Production of corn in States tributary to the Great Lakes*

[In thousands of bushels]

State	1919	1920	1921	1922	1923	1924
Ohio	161,392	172,081	155,185	149,097	159,859	89,232
Indiana	166,500	195,777	169,848	176,305	192,616	113,920
Illinois	294,000	314,133	305,966	313,074	337,312	295,218
Michigan	65,000	66,534	66,417	60,716	58,167	45,885
Wisconsin	86,715	89,294	97,482	98,300	83,361	56,810
Minnesota	116,000	123,300	156,620	131,307	154,692	124,065
Iowa	416,000	473,800	430,500	466,380	436,428	305,536
Missouri	152,550	212,672	182,880	178,125	196,860	151,200
North Dakota	16,764	13,656	17,360	21,450	28,207	28,380
South Dakota	91,200	109,500	125,632	110,038	145,176	102,538
Nebraska	184,186	255,528	207,732	182,400	272,052	191,752
Kansas	62,320	132,686	96,748	98,391	122,149	130,656
Montana	1,728	2,226	3,800	5,540	9,490	7,560
Wyoming	800	1,200	1,232	2,688	4,050	2,160
Colorado	11,757	24,231	15,979	18,320	37,625	14,500
Idaho	1,225	1,620	1,645	1,976	3,066	2,026
Total above 16 States	1,828,137	2,188,238	2,035,026	2,014,107	2,241,110	1,661,438
Total United States	2,858,509	3,208,584	3,068,569	2,906,020	3,053,557	2,309,414
Per cent above 16 States of total United States	63.9	68.2	66.3	69.3	73	72

State	1925	1926	1927	1928	10-year average
Ohio	179,568	147,231	109,720	136,725	146,009.0
Indiana	203,232	177,536	132,458	161,322	168,951.4
Illinois	394,506	322,175	254,070	367,488	319,794.2
Michigan	65,680	54,162	38,995	51,135	57,269.1
Wisconsin	101,602	73,106	68,250	91,203	84,612.3
Minnesota	148,896	147,662	127,246	143,115	137,290.3
Iowa	492,648	435,630	386,986	476,012	431,992.0
Missouri	198,860	176,011	168,084	181,540	179,878.2
North Dakota	24,816	18,162	23,975	24,426	21,719.6
South Dakota	78,365	83,340	134,995	93,849	107,463.3
Nebraska	236,600	139,407	291,446	212,701	217,380.4
Kansas	109,942	61,193	176,910	179,118	117,011.3
Montana	6,584	3,949	7,168	5,206	5,325.1
Wyoming	4,393	3,520	3,520	3,006	2,656.9
Colorado	22,005	10,472	19,902	18,694	19,348.5
Idaho	3,198	2,706	3,116	2,438	2,301.6
Total above 16 States	2,270,895	1,856,262	1,946,841	2,147,978	2,019,003.2
Total United States	2,916,961	2,692,217	2,763,093	2,839,959	2,861,688.3
Per cent above 16 States of total United States	78	69	70	76	70.5

Barley.—The production of the United States and Canada together amounted to an annual average of 293,305,000 bushels, of which 225,618,200 bushels or 76.9 per cent originated in the territory tributary to the Great Lakes. Production of barley in both the United States and Canada showed a remarkable increase in 1928.

TABLE NO. 42.—*Production of barley in States tributary to the Great Lakes*

[In thousands of bushels]

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	10-year average
Ohio	3,150	2,825	2,522	1,424	1,998	1,540	3,410	3,712	4,185	9,191	3,395.7
Indiana	1,430	2,187	1,235	510	690	480	736	575	833	2,256	1,093.2
Illinois	5,724	5,533	4,550	5,605	6,612	7,200	10,395	9,362	13,364	20,060	8,840.5
Michigan	5,320	6,630	3,500	3,598	3,600	3,370	3,160	3,790	5,301	8,100	4,636.9
Wisconsin	13,568	15,913	10,642	14,220	13,252	12,512	16,965	17,974	21,390	26,898	16,333.4
Minnesota	18,200	22,375	18,700	24,062	24,050	29,280	32,940	32,675	43,800	60,000	30,608.2
Iowa	8,032	4,950	3,196	4,605	4,503	4,216	5,478	8,174	14,256	27,068	8,447.8
Missouri	330	196	154	115	162	100	186	216	161	374	199.4
North Dakota	14,950	19,530	16,988	25,704	21,875	38,168	38,970	21,050	42,406	55,564	29,520.5
South Dakota	19,250	25,700	19,040	20,263	20,025	21,330	23,790	7,858	36,000	35,675	22,893.1
Nebraska	5,577	7,424	4,915	4,356	9,492	6,275	5,662	4,699	7,577	14,018	6,999.5
Kansas	16,200	19,482	14,560	18,580	20,513	7,376	6,080	3,032	5,695	17,661	12,917.9
Montana	540	1,152	1,538	2,300	2,678	2,600	3,276	3,600	6,435	6,374	3,049.3
Wyoming	525	216	261	560	840	725	1,122	1,386	2,006	2,310	995.1
Colorado	3,900	5,292	4,444	3,534	8,700	6,540	8,610	6,080	9,020	13,128	6,924.8
Idaho	3,360	3,220	2,784	2,890	3,999	3,658	5,456	4,144	5,676	6,192	4,137.9
Total above 16 States	120,056	142,625	109,029	132,326	142,989	145,370	166,236	128,327	218,105	304,869	160,993.2
Total United States	165,719	189,332	154,946	182,068	197,691	181,575	216,554	184,905	265,882	356,868	209,554.0
Per cent above 16 States of total United States	72.4	75.3	70.4	72.7	72.3	80.1	76.8	69.4	82.0	85.4	76.8

TABLE NO. 43.—*Production of barley in Provinces tributary to the Great Lakes*

[In thousands of bushels]

Year	Alberta	Saskatchewan	Manitoba	Total	Total Canada	Per cent of three Provinces of total Canada
1919	10,562	8,971	17,149	36,682	56,389	65.0
1920	12,739	10,502	17,520	40,761	63,311	64.4
1921 [1]	11,657	13,343	19,681	44,681	59,709	74.8
1922 [1]	5,388	18,775	30,517	54,680	71,865	76.1
1923	14,774	19,278	25,726	59,778	76,998	77.6
1924	12,347	17,360	40,923	70,630	88,807	79.5
1925	11,273	18,105	39,213	68,591	87,118	78.7
1926	9,146	21,891	50,880	81,917	99,987	81.9
1927	12,000	27,129	36,717	75,846	96,938	78.2
1928	15,849	44,266	52,569	112,684	136,391	82.6
Average, 10 years	11,574	19,962	33,090	64,625	83,751	77.2

[1] The Miller's Almanac, 1921–22.

Rye.—While neither Canada nor the United States rank high among the rye-producing countries of the world, the statistics presented below make apparent the position of the region adjoining the Great Lakes in the rye industry of North America. Of the total production in the United States, 86.8 per cent originated in the 16 States utilizing the Great Lakes as a means of transportation, while 86.6 per cent of the total output of Canada came from the three tributary Provinces. During the 10-year period the territory served by the Great Lakes produced an annual average of 68,802,600 bushels of rye.

TABLE NO. 44.—*Production of rye in States tributary to the Great Lakes*

[In thousands of bushels]

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	10-year average
Ohio	1,886	1,296	1,079	1,235	1,302	880	825	875	560	399	1,033.7
Indiana	5,320	3,892	3,978	4,200	4,186	2,174	1,653	2,102	1,618	946	3,006.9
Illinois	4,125	2,933	3,349	4,096	3,450	1,450	1,104	1,245	899	899	2,355.0
Michigan	13,500	9,849	8,346	8,218	6,538	3,480	2,700	2,336	2,617	2,366	5,995.0
Wisconsin	8,295	6,160	5,046	7,139	5,062	5,644	3,789	3,840	4,046	2,171	5,119.2
Minnesota	7,830	8,806	11,200	21,926	12,312	14,718	5,824	5,940	7,009	5,950	10,151.5
Iowa	1,113	544	564	1,084	898	702	525	542	645	972	758.9
Missouri	720	336	336	336	325	270	264	310	176	228	330.1
North Dakota	15,560	9,740	10,230	28,980	10,296	20,520	15,870	9,287	23,063	12,710	15,625.6
South Dakota	6,500	2,768	3,056	9,108	3,496	3,430	1,682	639	2,772	1,458	3,490.9
Nebraska	6,650	1,819	1,918	2,106	1,584	2,740	2,522	2,606	4,110	3,486	2,954.1
Kansas	2,520	1,456	1,141	788	348	568	383	480	576	518	877.8
Montana	272	472	1,299	3,360	1,716	1,120	1,000	1,284	2,412	2,156	1,509.1
Wyoming	252	396	504	490	312	440	684	714	675	440	490.7
Colorado	1,258	1,180	1,058	873	924	666	850	1,024	798	814	944.5
Idaho	135	112	216	195	266	30	60	46	48	48	115.6
Total above 16 States	75,936	51,759	53,320	94,134	53,015	58,832	39,735	33,270	52,024	35,561	54,758.6
Total United States	88,478	60,490	61,675	103,362	63,077	65,466	46,456	40,795	58,164	41,766	62,972.9
Per cent above 16 States of total United States	85.8	85.6	86.5	91.1	84.0	89.8	85.4	81.5	89.4	85.1	86.8

TABLE NO. 45.—*Production of rye in Provinces tributary to the Great Lakes*

[In thousands of bushels]

Year	Alberta	Saskatchewan	Manitoba	Total	Total Canada	Per cent of three Provinces of total Canada
1919	1,723	2,000	4,089	7,812	10,207	76.5
1920	3,420	2,535	2,319	8,274	11,306	73.2
1921	1,999	13,546	3,565	19,110	21,455	89.1
1922	6,187	16,164	7,078	[1] 29,429	32,373	90.9
1923	7,640	8,582	4,620	20,842	22,232	93.7
1924	2,744	2,507	5,875	11,126	13,751	80.9
1925	877	2,850	3,288	7,015	9,158	76.6
1926	1,374	5,454	3,563	10,391	12,179	85.3
1927	3,131	7,941	2,215	13,287	14,950	88.9
1928	2,680	8,412	2,066	13,158	14,617	90.0
Average, 10 years	3,178	6,999	3,868	14,044	16,223	86.6

[1] Includes British Columbia.

Flaxseed.—Tables have been prepared showing the production of flaxseed in the United States and Canada during the 6-year period 1923 to 1928, inclusive. All of the United States flaxseed produced during this period originated in States which are interested in the Great Lakes as a means of transportation, and 98.1 per cent of the Canadian flaxseed originated in the three Provinces utilizing the Great Lakes.

TABLE NO. 46.—*Production of flaxseed in United States, 1923–1928, inclusive*

[Quantities in thousands of bushels]

	1923	1924	1925	1926	1927	1928	6-year average
Wisconsin	97	104	152	132	132	122	123.2
Minnesota	5,270	8,117	7,400	7,652	7,343	5,518	6,883.3
Iowa	56	94	105	174	228	198	142.5
Missouri	-------	9	8	16	46	56	22.5
North Dakota	8,085	15,920	9,496	7,590	10,184	8,115	9,898.3
South Dakota	2,414	4,877	3,801	2,755	5,940	3,410	3,866.1
Nebraska	44	56	54	61	70	64	58.1
Kansas	182	370	306	262	170	172	243.7
Montana	902	2,140	1,098	693	1,734	1,666	1,372.2
Wyoming	10	-------	-------	-------	-------	-------	1.7
Colorado	-------	24	4	-------	-------	-------	4.7
Total United States production	17,060	31,711	22,424	19,335	25,847	19,321	22,616.3

TABLE NO. 47.—*Production of flaxseed in Provinces tributary to Great Lakes*

[In thousands of bushels]

Year	Alberta	Saskatchewan	Manitoba	Total	Total Canada	Per cent of three Provinces of total Canada
1923	156	5,494	1,395	7,045	7,139	98.7
1924	56	6,119	3,403	9,578	9,695	98.8
1925	83	4,870	1,125	6,078	6,237	97.5
1926	83	3,744	2,051	5,878	5,995	98.0
1927	202	3,373	1,198	4,773	4,885	97.7
1928	61	2,654	804	3,519	3,614	97.4
Average, 6 years	107	4,376	1,663	6,145	6,261	98.1

All grains.—Table No. 48 shows the production of all grains, with the exception of flaxseed, in the States and Provinces tributary to the Great Lakes during the 10-year period, compared with world production. It is apparent that this territory produces about one-third of the world's grain, excluding that produced in Russia and China.

TABLE NO. 48.—*Production of grain (wheat, oats, barley, corn, rye) in States and Provinces tributary to Great Lakes*

[In thousands of bushels]

Year	Sixteen States of the United States	Alberta	Saskatchewan	Manitoba	Total	Estimated world total, excluding Russia and China	Per cent of world totals
1919	3,588,094	112,585	213,122	119,941	4,033,742	11,901,000	33.9
1920	4,197,576	214,711	267,721	115,038	4,795,046	13,152,000	36.5
1921	3,618,687	130,892	385,402	111,742	4,246,723	12,719,000	33.4
1922	3,898,268	108,841	485,207	174,025	4,666,341	13,025,000	35.8
1923	4,050,103	282,225	517,557	124,854	4,974,739	14,269,000	34.9
1924	3,813,882	131,654	250,130	158,991	4,354,657	12,765,000	34.1
1925	4,252,407	168,874	358,724	126,232	4,906,237	[1] 14,324,000	34.3
1926	3,531,447	171,985	357,184	154,354	4,214,970	[1] 13,835,000	30.5
1927	3,829,004	287,577	430,096	95,472	4,642,149	[1] 13,926,000	33.3
1928	4,388,535	277,786	529,936	160,394	5,356,651	[2]	[2]

[1] Preliminary.

[2] Not yet available.

GRAIN ROUTES TO SEABOARD

Grain from the surplus producing sections of the United States now moves to seaboard for export and for domestic consumption by way of many routes, some of which are keenly competitive, so far as grain destined to the western European consuming pool is concerned, especially. There is less competition for movements to other portions of the world, particularly to the Orient which consumes increasing quantities of grain. The foregoing tables show clearly that the territory served in part by the Great Lakes transportation route is one of the most important, if not the most important, grain-producing areas in the world. Notwithstanding the large consumption of grain in the United States, there is every year a large surplus which must be disposed of in foreign markets. The center of this producing territory is situated considerably more than 1,000 miles from the sea, and the cost of getting grain from the farm to the ship at our ocean ports is a very important factor in fixing not only the profits of the farmer, but our ability as a nation to compete successfully with other countries whose grain-producing areas are situated nearer the seaboard. The sensitiveness of grain to transportation costs is well indicated by figures given later in this report, showing the enormous quantities naturally gravitating to the lake route, which is the cheapest from a very large section of the country. Not all the grain seeking the lake route, however, is for export; large quantities are for domestic consumption, including milling at eastern and seaboard points.

It is well known that a saving of as little as one-fourth cent per bushel will serve to divert substantial movements of grain. Indeed, the situation is such that the grain shipper must constantly be alert not only with respect to the actual rates over the various routes, but also the conditions affecting the promptness of movement, the situation at the terminal elevators, etc. Grain is very desirable deadweight cargo for liners, and it has been generally recognized that the interests of shipping render it undesirable to include grain rates among those rigidly fixed by conference, because of the fact that vessels must be left free to compete for grain which they need for loading. The situation is such that the water rates, both lake and ocean, are constantly changing and these changes affect the through transportation costs, regardless of the fact that the rail portions thereof are fixed. The actual quantities of grain moving to seaboard from year to year over each of the routes vary widely.

Formerly the grain from points north and west of Cairo, Ill., flowed chiefly through the North Atlantic ports of the United States. Even that from Montana and Idaho was largely shipped to North Atlantic ports, and that from the Missouri River territory took a similar route.

Routes to the Atlantic seaboard.—Grain from the Dakotas and Minnesota, as well as from the Canadian Provinces, moves chiefly to the Great Lakes, with a very small portion passing through Gulf ports. The Canadian grain is forwarded principally to Port Arthur-Fort William on Lake Superior, where are located public and private elevators with a total capacity in excess of 87,000,000 bushels. The shipping capacity of these elevators so far exceeds the receiving capacity at Montreal and Quebec that a large share of the Canadian grain in the past has of necessity moved through American ports, and the task of accommodating this enormous movement reaching the lower Lakes has fallen largely to the port of Buffalo.

Grain for export from the northern tier of States moves chiefly to Duluth-Superior, while that from Illinois, Indiana, Iowa, and portions of Missouri, Kansas, South Dakota, Minnesota, and Wisconsin moves to Chicago and Milwaukee. Some of the Illinois and Indiana grain moves to Toledo and other Lake Erie ports. Not much change has occurred in recent years in the movement from the more northerly wheat States with the exception of the diversion of a small portion to Gulf ports. The influence of the Mississippi-Warrior Barge Line has been instrumental in a rather pronounced movement of grain to Gulf ports from Missouri River territory and from Kansas and Nebraska. The diversion has occurred principally in the grain which formerly moved all-rail to the Atlantic seaboard and has not affected that produced in the territory which makes the largest contribution to the Great Lakes system. The four ports of Fort William-Port Arthur, Duluth-Superior, Milwaukee, and Chicago, together ship nearly all the grain which moves from the upper Lakes. The water-borne grain from these ports in recent years has exceeded 500,000,000 bushels. The movement of this grain will be shown in detail later in this report. The present purpose is to indicate merely the routes which it takes to the sea. As already indicated, the grain moving to North Atlantic ports of the United States goes chiefly to Buffalo for transshipment, although some is transshipped at Erie, Fairport, and other Lake Erie ports of the United States, and in addition a considerable amount goes to Georgian Bay ports. Of the latter, some eventually reaches the North Atlantic ports of the United States, while some goes by rail lines to Montreal, Quebec, St. John, and Halifax, and the remainder is distributed to interior points in both the United States and Canada. Most of the grain moving all-water to Montreal must pass through a transfer elevator at the foot of Lake Erie, although a small part goes through to Montreal in small type vessels directly from the head of the Lakes. The principal point of transfer from the large lake vessels to the small type capable of navigating the Welland Ship Canal and St. Lawrence Canal is Port Colborne. During recent years, however,

the grain seeking this route has been greater than the Port Colborne elevator could handle, and considerable grain has been transferred from the large to the small carriers at Buffalo.

The completion of the new Welland Ship Canal and construction of transfer elevators at Toronto, Kingston, and Prescott will undoubtedly have a marked effect upon the total amount of grain transshipped at Buffalo for Montreal. Much of the grain enroute to Montreal that heretofore has been transferred from lake vessels to canal-sized steamers will undoubtedly go direct to Kingston or Prescott for transfer instead of to Buffalo as at present.

During the season of navigation on the St. Lawrence River, grain is exported from Montreal and Quebec, and the elevators at St. John and Halifax are idle except for local business. With the closing of navigation on the St. Lawrence River the vessels operating to Montreal and Quebec are transferred to Canadian ocean ports, and some of them to the ports of Portland, Me., Boston, and even New York. At the Georgian Bay ports grain is accumulated during the latter part of the navigation season and held in storage for shipment during the winter through North Atlantic ports and for supplying domestic requirements of New England and interior Canada.

Grain reaching Buffalo may be transferred to barges and moved to New York over the enlarged New York State Barge Canal and Hudson River, through navigation being now available for barges carrying up to 2,000 tons. It may also be moved, though generally at higher rates, by rail lines from Buffalo to New York and other North Atlantic ports. Some grain moves from Erie to Philadelphia via the Pennsylvania Railroad, and some from Fairport to Baltimore via the Baltimore & Ohio Railroad. Some also reaches Baltimore by way of the Pittsburgh & Lake Erie and Western Maryland railways.

In addition to the routes mentioned which include water transportation to a greater or less extent, there are all-rail routes extending from Chicago and from the central western primary markets directly to North Atlantic ports. Large quantities of grain are received at New York, Philadelphia, and Baltimore by these all-rail routes. There is very little difference in the cost of moving grain from Chicago to New York, whether the grain be sent by all-rail line or by lake to Buffalo, and thence by rail to destination. When the lake rate is 3 cents per bushel or more from Chicago to Buffalo, the lake route offers no advantage on export grain, as the cost of transfer through the elevators at Chicago and Buffalo offsets the slight apparent advantage of the water route. Ordinarily the shipments by rail from Chicago exceed the shipments by lake, but the reverse is true of ports on Lake Superior.

Routes to Gulf ports.—The distance from New Orleans to Liverpool is 5,312 statute miles as compared with a distance of 3,578 statute

miles from New York to Liverpool (winter route), a difference in favor of New York of 1,734 statute miles. Nevertheless the cost of transportation by ocean vessel is so much less than the cost of transportation by rail that Gulf ports form the cheapest outlet for grain from an important producing section of the country. At present the Gulf ports are drawing heavily from the Missouri River section and this grain is flowing particularly to the port of New Orleans.

Some grain flows through Mobile, and some through Port Arthur and Texas City. New Orleans and Galveston, however, handle the bulk of the wheat passing through Gulf ports. New Orleans is the only port having the advantage of low rates due to river transportation. This advantage has been an important factor in influencing movements from Missouri River territory, but it apparently has not drawn any considerable amount of grain from the territory which normally ships through Galveston. The latter port draws a large share of its exports from Kansas, Oklahoma, and north Texas.

A study of the actual movements of wheat during the calendar year 1921 through the port of Galveston shows that the shipments originated in 19 States, extending all the way from the State of Washington to the State of Tennessee. The States from which this wheat was shipped were Arkansas, Colorado, Iowa, Idaho, Kansas, Minnesota, Missouri, North Dakota, Nebraska, Nevada, New Mexico, Oklahoma, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin, and Wyoming. The movement through Gulf ports occurs during the cotton-shipping season. The flow of grain through these ports has been influenced not only by the rail rate to seaboard, but also by the fact that grain is sought as dead weight by vessels carrying cotton from these ports to Europe. Cotton is not suitable for handling in full cargoes, and some heavy material is necessary in order properly to balance the load. Hence, vessels carrying cotton, which takes a comparatively high freight rate, are able to offer low rates on grain. The favorable loading conditions during the fall months have been instrumental in the extensive utilization of these ports for grain shipment.

Routes to Pacific ports.—The situation in the producing territory contiguous to the Pacific coast is wholly different from that in the territory east of the Rockies. The Pacific coast territory lacks the country elevators which form such an important part in handling grain in other sections of the country. Moreover, until recent years, the ports were not supplied with elevators for any considerable amount of grain. The movement through Pacific ports is a development of the last few years, during which time elevators have been established by the port authorities at Portland, Astoria, and Seattle. There are also privately owned elevators at these ports and at Tacoma,

Wash., Oakland and Vallejo, Calif. Grain is generally sacked at the farm and upon arrival at the port must be bulked and graded. The method of handling grain is influenced by the fact that part of the exports are destined to the Orient, and inasmuch as there are no elevators at destination, grain in this trade is shipped almost exclusively in sacks.

During the last few years there has been a very heavy increase in the shipment of grain from North Pacific ports to the United Kingdom and Europe, chiefly from Portland, Oreg., and this grain is shipped in bulk. As in the case of the increased movement via the St. Lawrence and the Mississippi Rivers, the heavy increase in rail rates since the war has been instrumental in bringing the Pacific ports into more active use as outlets for grain. All-rail eastbound rates on grain from Pacific coast territory have been placed upon a basis which is practically prohibitive. The effect has probably been a permanent diversion of grain from easterly routes because it has made necessary the provision of facilities and marketing arrangements not formerly in existence but which are now upon a firm operating basis. A large amount of barley is raised in California and handled in sacks through San Francisco, which has recently constructed a grain terminal for this trade.

Conspicuous in the grain trade of the Pacific coast is the port of Vancouver, British Columbia. The grain trade of this port, which a few years ago amounted to little or nothing, has developed to large proportions. The grain flowing to it originates in British Columbia and Alberta.

MOVEMENT OF GRAIN TO UPPER LAKE PORTS

HANDLING UNITED STATES GRAIN BETWEEN FARM AND LAKE TERMINAL

Marketing.—Until very recent years the American farmer very generally disposed of his grain crop by selling to local agents of large buyers with headquarters in the cities which constitute the primary grain markets. The buyers issued daily price lists indicating their offers for various grades of grain in accordance with market conditions. In the Northwest, grain was generally sold on consignment, while in the Southwest it was sold either "on track" at the country elevator or "to arrive" at the terminal. Cooperative grain marketing was not extensively practiced, but recently this form of marketing has received a great impetus, until to-day between 40 and 50 per cent of the grain crop is marketed through one form or another of cooperative grain associations.

There are two types of farmer-owned grain marketing associations, the farmers' local elevator and the large-scale organization. Due to differences in operating practices and kinds of grain handled, the

local elevators may be divided into five main areas: (1) *Spring wheat*, mainly in Minnesota, North Dakota, northern South Dakota, Montana; (2) *winter wheat*, western Nebraska, Kansas, eastern Colorado, Oklahoma, Texas, western Missouri; (3) *Corn Belt*, Illinois, Iowa, eastern Nebraska, eastern South Dakota, southern Minnesota, northern Missouri, western Indiana, northwest Ohio, and Wisconsin; (4) *soft wheat*, western Ohio, eastern and central Indiana, and southern Michigan; (5) *Pacific coast area.*

Briefly, the principal characteristics of the farmers' elevator association are: (1) Membership confined substantially to grain producers; (2) voting control by patron members instead of investment control; (3) limitation of dividends on capital stock to local interest rates; and (4) proration of excess earnings upon basis of patronage. In addition to grain purchased from farmers' elevators, some farmers' elevators reported handling grain for state-wide pooling organizations.

Storage and handling of grain for individual farmers and pool organizations are important activities of farmers' elevators; along with such services as feed, grinding, mixing, cleaning, and treating of grain.

Methods of sale.—Present methods of sale practices by farmers' elevators include sales "on track," "to arrive," "consigned," and "local." For the United States as a whole, the "consignment" method is used most extensively, with "on track" second and "to arrive" third.

State and national farmers' elevator associations.—In addition to local elevator associations, about a dozen state-wide overhead service associations and a national association have been formed. The Farmers' National Grain Dealers' Association, composed of 10 State associations, functions to assist State organizations in matters such as legislation, transportation rates, and other matters affecting the welfare of the farmers' elevator movement. The State organizations perform certain services, the most common of which are (1) assistance in organization, (2) bonding of managers, (3) aid in transportation problems, (4) elevator insurance, (5) cooperative purchasing, and (6) auditing.

Large-scale marketing organizations.—While major attention of cooperative marketing has been given local farmer-owned elevators, a number of organizations are formed for marketing beyond the local shipping point. These fall into three types, (1) line elevator associations, (2) grain commission agencies, and (3) wheat pools.

Line elevator associations.—Herein the member invests in the stock of the central company, and the local elevator is under direct control of central management, with local officials acting merely in an advisory capacity. Prices are generally determined by central office.

Line elevator organizations also at times operate terminal elevators, providing for storage, cleaning, reconditioning, and mixing grain.

Cooperative associations.—Only a few such organizations have been formed in the United States.

Cooperative grain commission agencies.—These handle grain for farmers' elevators, independent elevators, and direct from farmers, with the major portion of business coming from the farmers' elevators.

Commission companies are in fairly close touch with elevators by market letters, telephone, and telegraph. Business is solicited on a voluntary basis, and no attempt is made to regulate the movement to market. The associations are, with rare exceptions, members of grain exchanges. The usual commission rates are charged by the cooperative companies, and surpluses are credited to the account of shareholders and patrons.

The wheat-pool movement.—The third type of large-scale cooperative grain-marketing association is commonly known as the "wheat pool," which is State or regional in scope. They have contracts with farmers to sell all marketable grain produced by them, paying a substantial money advance when the grain is delivered, the balance when the grain is sold. The price paid is the average received for the grade which the farmer delivers. Wheat pools are represented on terminal markets, and several of them operate country and terminal elevators.

Federal supervision of grain standards.—The United States grain standards act passed in 1916 authorized the Secretary of Agriculture to establish standards of quality and condition of grain and provided that no grain shall be shipped in interstate or foreign commerce unless the grain shall have been inspected and graded by an inspector licensed under that act. The practical application of the law does not disturb to any great extent the former procedure by which grain was inspected by representatives of boards of trade, chambers of commerce, and other bodies, but it does require that the inspectors employed by such organizations be duly licensed under the grain standards act. Probably the most pronounced change in conditions brought about by the act, in addition to the fixing of grades and the methods of their determination, arises from the provisions of section 6 authorizing appeals. The result of this section is seen in the increasing number of appeals handled by the various local offices of Federal grain supervision. It has simplified the procedure as affecting reinspection, but does not entirely do away with the reinspections and appeals made through State agencies. The requirements as to sampling and testing the various grains are explained in a handbook issued by the Bureau of Agricultural Economics, United States Department of Agriculture.

While the procedure with respect to sampling and inspecting grain differs somewhat in the several States, within the limits permissible

under Federal law, a good idea of the prevailing practice may be obtained from the methods employed at Duluth. The order or procedure from the country shipping point to the terminal market is as follows:

The car having been billed to the port of Duluth, moves forward until it reaches a sampling point, where it is placed on the sampling tracks. The sampling points are Cass Lake, Willmar, and Sandstone on the Great Northern Railway, Staples on the Northern Pacific, and Glenwood and Thief River Falls on the Minneapolis, St. Paul & Sault Ste. Marie Railway. If the car does not pass through these points, it will be sampled when it reaches Duluth or Superior.

Sampling.—Samplers in the employ of the State of Minnesota are stationed at the sampling points. The car is first inspected as to its condition and the condition of the seals, and if any difficulty is found, a note is made of the fact on the record which is later forwarded to Duluth. The sampler then breaks one of the seals and after making a record of its number enters the car and proceeds to secure an average sample of the grain. Samples are taken from various parts of the car, the number of samples being not less than five for wheat and seven for flax. If any variation in the grain is found the sampler continues the probing until sufficient samples are secured to represent fairly the contents of the car. The samples are spread upon a cloth and an average taken of the entire lot. In case an average sample can not be secured on account of the variation in different parts of the car, samples are taken of the different qualities and a note made to indicate that the load is uneven. Sometimes the cars are loaded too full to permit use of the probe or trier, and in such cases the sampler makes a note of the fact so that the car may be sampled when it is unloaded at the elevator. The sample taken by the State representative is placed in a small sack which with other similar samples is sealed, boxed, and forwarded by express to the State inspection department at Duluth.

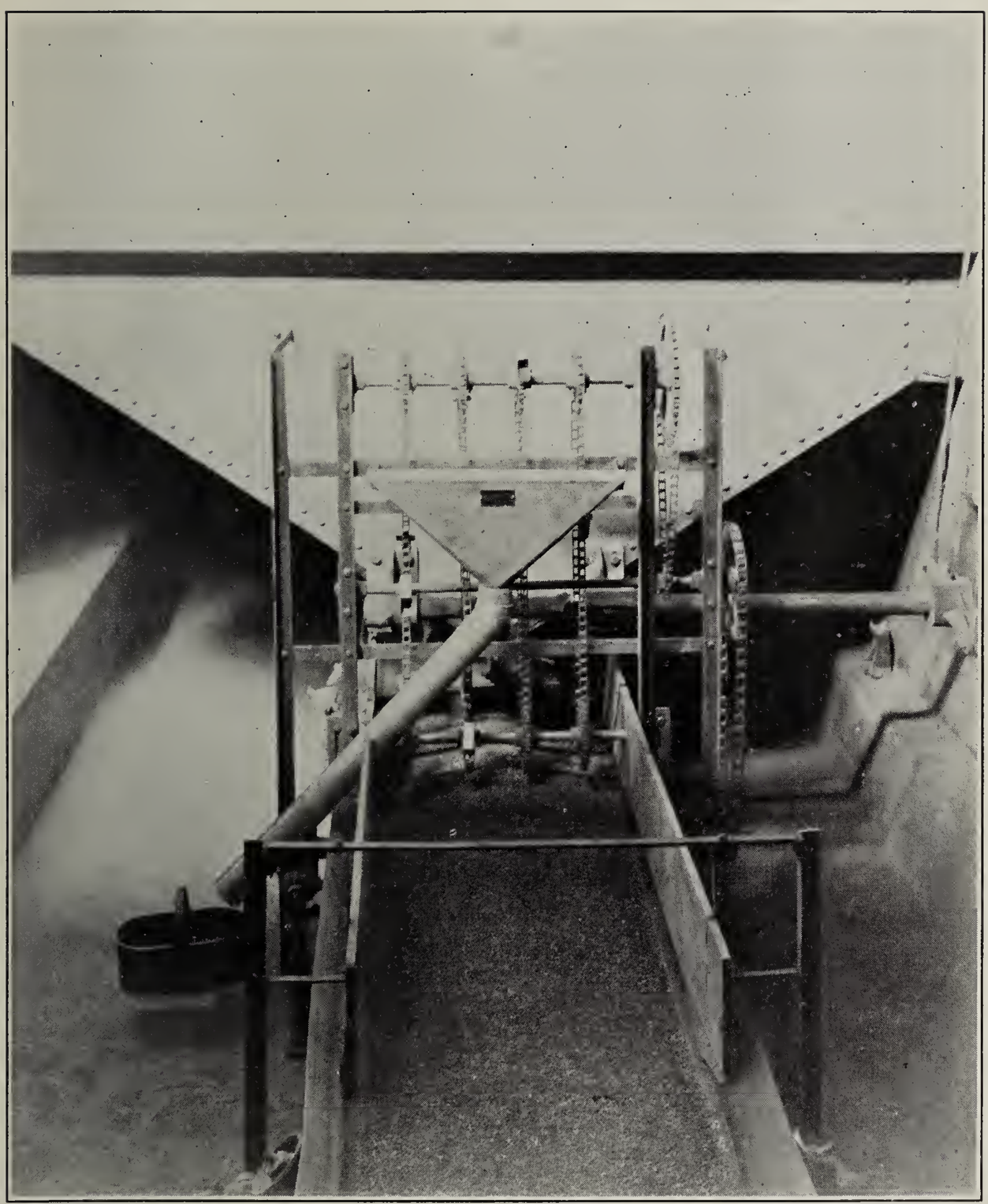
When the State sampler has completed his work and left the car, another sampler employed by the Duluth sampling bureau enters. This bureau is maintained by the commission men for the purpose of procuring independent samples of every car of grain in order that they may have a check on the work of the State samplers. The procedure is identical with that followed by the State samplers. After the second sample has been taken, the State representative reseals the car with a State seal.

Inspection.—Upon arrival at Duluth the samples taken for the State are delivered to the office of the inspection department and go immediately to the deputy inspector. Inside of each sack is a card bearing the number of the car from which the grain was taken, but there is no way by which the inspector can determine the owner-

ship of the grain. The inspector empties the sample upon a table in front of him and examines it to determine the grade. Sieves and scales are used to ascertain the amount of foreign matter in the grain, by which the dockage (allowance for refuse) is fixed. This completes the original inspection of the grain, and the record made is then ready for the inspection of the commission man representing the owner of the grain. In the meantime the Duluth sampling bureau has received the samples taken by its representatives, and has distributed them to the commission men according to the manifests. The samples are examined by the commission houses and are graded and sifted, and tested by scales for dockage, in the same manner as by the State inspectors. After his inspection is completed the commission man is able to determine whether the grade and dockage fixed by the State inspectors are satisfactory. In case the results show a variation, the commission man may file a request for reinspection.

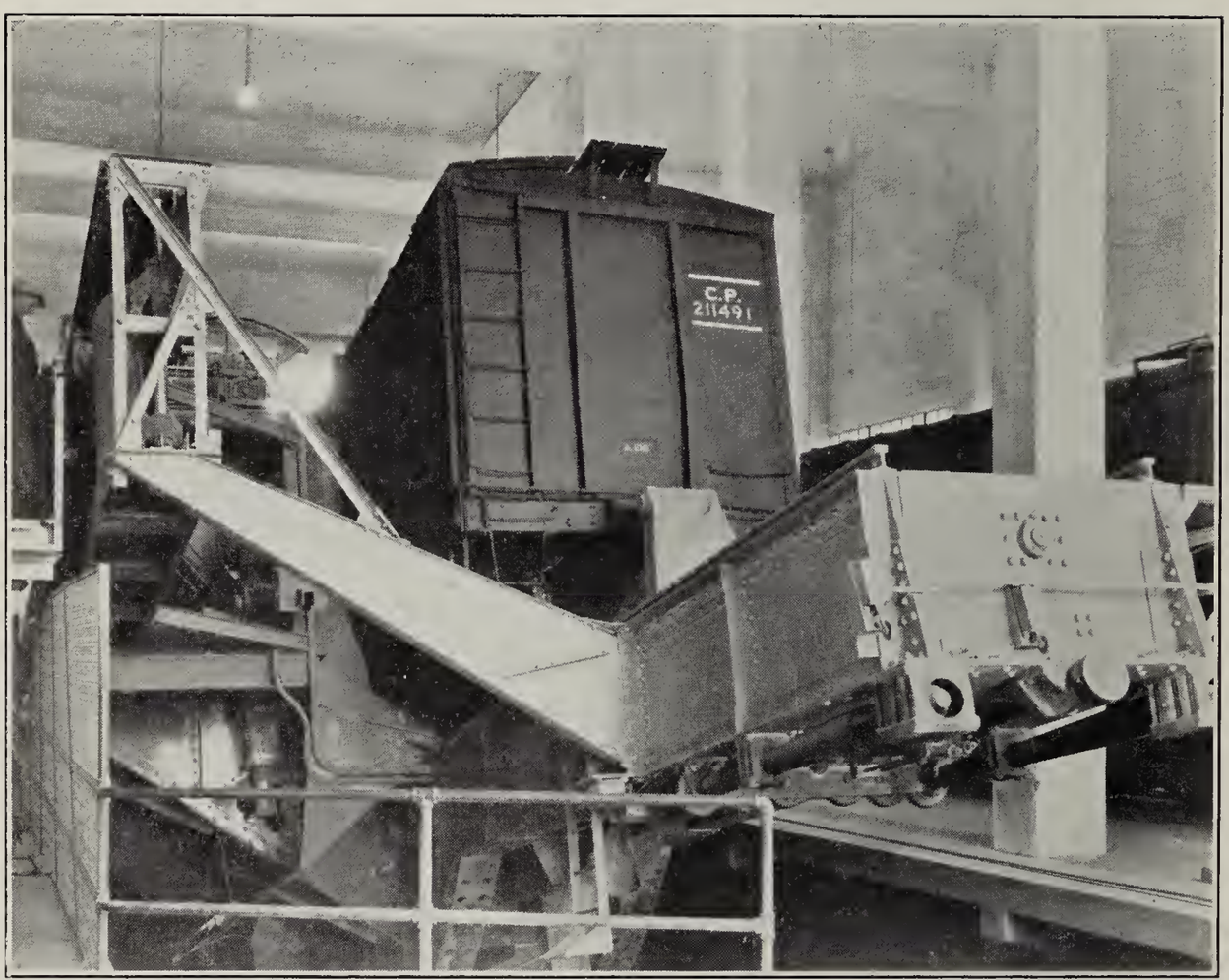
Reinspection.—When a reinspection is called for, the sample is taken by the chief inspector or his first assistant. If the result is still unsatisfactory, an appeal may be taken to the State board of grain appeals. There are two such boards in Minnesota, one at Duluth and the other at Minneapolis. As a large amount of intrastate grain arrives at Minneapolis, the State board at that place receives many appeals. The grain received at Duluth, however, is principally in transit to points beyond. The State board at Duluth is now rarely appealed to. The handlers of grain assume that no matter what may be the decision of the State board of grain appeals, the matter will be taken to the Federal supervision, and the time and expense of an appeal to the State board may advantageously be saved. At the present time, the reinspection by the chief or deputy inspector at Duluth is being generally asked for, and from his decision appeal is taken directly to the Federal supervision. In the case of intrastate grain, the decision of the State board of grain appeals on the original sample is final. It does not, however, entirely dispose of the matter if the commission man wishes to go farther. If, by producing his own sample before the board of appeals, he can show that the sample taken by the State representative is not properly representative of the grain in the car, the board may order the car to be resampled. When it reaches the railroad yards it will then be again sampled by the State men and the board of appeals will then pass upon the new sample.

After this decision, if the result is still unsatisfactory to the commission man as to the amount of dockage, he can order it cleaned in an elevator. If he does not believe that the sample was fairly representative of the car, he can order the car transferred when unloaded, by loading it back into the car immediately. It then becomes



AUTOMATIC GRAIN SAMPLER AT A PORT ARTHUR ELEVATOR

94—1



CAR DUMPERS, UNITED GRAIN GROWERS' ELEVATOR, PORT ARTHUR, ONTARIO

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a car loaded out and a new sample is taken which can be carried through the same procedure as was the original sample from the car. It is not often that this procedure is considered necessary.

Weighing.—The weighing of the car at the elevator or mill where it is unloaded is supervised by the weighing department of the State of Minnesota. When the car arrives for unloading, a weighman makes a thorough examination to determine its physical condition, and reports to the chief weighmaster any defects or leaks that are apparent, and any conditions that seem to indicate that the car has been tampered with. These records are compared with those made at the sampling points. When the inspection is complete the car is unloaded, after which the weighman examines the car to see that all the grain has been removed. In all the elevators at Duluth grain is unloaded into pits and lifted by elevators to the top of the house where it passes into garners and then drops into scales. When the grain is all elevated, the weighman drops a light provided for that purpose into the pit in order to examine it clearly and, finding it empty, signals to a man at the top of the house, after which the State and elevator weighmen proceed to take the weight of the car. A delicately adjusted signal on every scale shows whether it is empty or not, and every precaution is taken to make certain the full weight of all grain. The scales have an automatic punch which registers upon a card the weight shown by the scale.

HANDLING CANADIAN GRAIN BETWEEN FARM AND LAKE TERMINAL

Marketing.—The methods of buying and selling, handling, inspecting, and transporting grain, and of performing numerous services and operations in connection with this trade are regulated by the Canada grain act, which, with the exception of certain sections, went into force on April 13, 1912.

Since then many amendments to the act have been made. In 1925 a consolidating act was passed. Most important amendments were passed by the House of Commons on June 7, 1929. Under these amendments the members of the wheat pool have been given added protection in many ways. Some of the more important of the 1929 amendments may be briefly indicated as follows: (1) The board of grain commissioners is given added power in making investigations and submitting final findings under the grain act, with power to assess loss and damage sustained in handling and transportation of grain, which added power gives to the board the "teeth" for more effectively enforcing the law; (2) standard samples are supplied the appeal boards by the chief inspector, whereby the farmer's sample will receive the benefit of doubt as to whether the sample falls within the statutory grade; (3) the standards board is authorized to establish standards, for the statutory and the "commercial grades standards"; (4) the establishing of standard barley grades, which had

hitherto been neglected in the marketing procedure; (5) limiting the practice of mixing the statutory grades of wheat, after August 1, 1930; (6) giving to persons delivering wheat the right to demand warehouse receipts and also the right to designate to elevator agents what name shall appear on a ticket; a wheat pool member may now demand that his own name be placed on his ticket, and the wheat is then deliverable to the individual named or to his order, on track at any terminal he may designate; (7) correcting past abuses arising in connection with car distribution and car-ordering, whereby fictitious names were used and favoritism shown in the ordering and supply of cars.

This act provides for a commission to be known as the Board of Grain Commissioners of Canada, consisting of three members appointed by the governor in council. The commission reports to the Minister of Trade and Commerce. Prior to the passage of this act there had been much dissatisfaction in connection with the grading of grain, and the farmers were generally dissatisfied with the treatment which they received from the elevator companies, which were accused of various kinds of practices, of unjust weighing and grading, of paying prices that were too low, and exacting charges that were too high, and of pooling profits and forming monopolies. Complaints were directed also against the railroad companies for discrimination in the distribution of cars. This condition of affairs led to legislative action from time to time, later codified in the Canada grain act, but not before the grain growers had found it necessary to organize cooperative associations and to build a number of elevators to protect themselves from the alleged unfair practices of private elevators and buyers.

Farm sales.—The farmer may sell his grain to track buyers, commission agents, he may ship it to Winnipeg to be sold there, or he may deliver it to the Canadian wheat pool, which now receives the greater portion of the Canadian wheat. All track buyers, commission agents, and others interested in the grain trade in the West are held responsible by a system of bonds and licenses for fair dealing with the farmer, according to specified rules under the grain act.

When the farmer takes his grain to an elevator he can either sell it to the operator or he can hire a bin in the elevator to keep his grain distinct from all other grain, or he can store it with all other grain of the same grade. If he stores the grain either in a special or general bin, he arranges with the railroad company for a car, and the elevator loads the grain into the car to his order. When the grain is loaded he can either sell it on the spot as track grain or send it forward consigned on commission. The farmer now hauls his grain unsacked, and bulk handling is the universal practice throughout the Canadian Provinces. The elevator's charges and tariffs are regulated

by the board of grain commissioners and the storage and purchase tickets are prescribed by the act.

Allotment of cars.—The grain act provides that in the distribution of cars every shipper of grain is to account for one person and nobody for more than one, except elevator companies who are entitled to two cars on each allotment. Each is entitled to a car or cars in turn and exception is made only in case of emergency, as when elevators are in danger of collapsing or where there is damp or heated grain requiring prompt removal. The Government control of the car distribution plays an important part in the efficient handling of the grain crop and the avoidance of farm losses due to inability to move the grain. When grain is sold by farmers at track platforms no certificate of grade is furnished, but the car is sealed and sent forward to Winnipeg, or other point of official inspection, or it may be sent by the farmer to any one of the licensed elevators in the Provinces.

Grades.—The Canada grain act defines the grades of the several grains. There are the statutory grades, only changeable by Parliament, each of which has certain specified qualities from a marketing standpoint. In addition to these grades there are certain other grades established by the standards board known as commercial grades, which include grain which for various reasons does not come within the standards described by law. As already indicated, the statutory definitions do not vary with the crop but are constant. The commercial grades on the other hand as fixed by the standards board may vary from year to year. In addition to the statutory and commercial grades, there are three classes known as "no grade," "condemned," and "rejected."

The standard of any grade is the minimum quality of that grade, so that when a buyer purchases No. 1 Northern wheat he knows that the wheat which will be delivered to him will not be lower in quality than the Government standard of that grade.

Inspection.—On grain moving eastward from the Provinces, the official inspection and grading is done at Winnipeg. The act provides that this inspection shall be final. The Winnipeg inspection is made separately for each car of grain and governs storage at the terminal elevators at Fort William and Port Arthur. It is required that grain shipped from any terminal or public elevator shall be shipped only as graded into such elevators, provided that when grain has deteriorated or changed condition in storage a certificate shall be issued in accordance with the facts. It is also provided that any car which is found upon arrival at a terminal elevator to be plugged or wrongfully loaded shall be reinspected.

One of the purposes achieved by the inspection of the grain at an interior point such as Winnipeg, is the avoidance of congestions and delays at the terminal elevators. Were the grain inspected at Fort

William or Port Arthur, the cars would have to be held pending not only the inspection and issue of certificates, but also possible demands for reinspection and appeals. When inspected at Winnipeg, or elsewhere west of Winnipeg, time is given not only for these essentials but also for the sale of the grain while en route. Grain moving to the Pacific coast is inspected at Calgary, Moose Jaw, Edmonton, Saskatoon, Medicine Hat, or Vancouver, and bonded grain moving all-rail into the United States is usually inspected at Duluth. That shipped from the elevators at Port Arthur and Fort William is inspected during the process of loading into the ship in order to verify the grade and be certain that no deterioration has taken place in storage. No official inspections of western grain are made at eastern elevators. The fees for the inspection are fixed by the grain act as follows:

In bulk, per carload	$1.00
In cargoes, for 1,000 bushels	1.00

These rates may be increased or reduced by the board with the approval of the governor in council.

It is essential to bear in mind that sales of Canadian grain in both foreign and domestic markets are made on the certificates issued by the board of grain commissioners for Canada. Such a certificate having been issued in the western inspection division, it becomes incumbent upon the operator of every terminal elevator to protect the integrity of the grading and the weights. Up to the time when the grain arrives at the terminal elevators its identity has generally been preserved, but at the terminal elevators it becomes merged with other grain of the same official grade. From this point to its final destination the most scrupulous care and utmost fidelity to duty must necessarily be exercised by everyone connected with the movement. While the statutory grades are definitely fixed, there may be considerable difference in the quality of various consignments of wheat coming within this grade and it may be readily understood that a very good "No. 2" may be made a "No. 1" by the admixture of a small quantity of the necessary quality to promote the grade. Such promotion of grades may not be done in public terminal elevators, but is carried on in private elevators where grain may also be promoted by separating injurious admixtures, etc. These operations are regarded as entirely legitimate in private terminal elevators. The method of marketing grain on certificate instead of by sample simplifies the trade processes and facilitates the movement, but such method, some claim, prevents the farmer from bargaining for better prices available at times under the sample system.

The distribution and use of Canadian grain are shown by Table No. 49, as follows:

TABLE NO. 49.—*Distribution of principal grains of Canada, 1927–28*

[Quantities in bushels]

	Wheat	Oats	Barley	Flax	Rye	Total
In store Aug. 1, 1927	47,839,285	22,838,874	4,880,417	1,958,764	1,264,193	78,781,533
Production, 1927	479,665,000	439,712,700	96,938,000	4,884,600	14,950,600	1,036,150,900
Imported from United States and other countries	473,308	2,448,927	3,429	3	88,112	3,013,779
Total	527,977,593	465,000,501	101,821,846	6,843,367	16,302,905	1,117,946,212
Shipped to United States	8,432,330	850,849	68,756	2,385,176	1,522	11,738,633
Shipped to United Kingdom	201,732,699	4,988,493	18,316,587	----------	5,741,299	230,779,078
Shipped to other countries	78,402,361	6,328,695	8,056,684	482	5,522,209	98,310,431
Milled and consumed at home	43,461,000	8,637,793	738,479	2,583,267	32,610	55,453,149
Milled and exported	44,395,893	2,625,505	----------	----------	----------	47,021,398
Used for seed	42,208,495	32,841,290	9,761,480	189,040	1,259,347	86,259,652
Consumed on farms and otherwise disposed of	31,718,744	380,122,916	61,420,167	389,055	1,664,978	475,315,860
In store July 31, 1928	77,626,071	28,604,960	3,459,693	1,296,347	2,080,940	113,068,011
Total	527,977,593	465,000,501	101,821,846	6,843,367	16,302,905	1,117,946,212

Source: Report of the Grain Trade of Canada, 1928.

CLASSIFICATION OF CANADIAN GRAIN ELEVATORS

Under the provisions of the Canadian grain act elevators in Canada are classified according to use, and their functions under this classification are regulated with a view to the protection of the public interest. These classifications are briefly as follows:

Country elevator.—Under this class are included all elevators and warehouses or flat warehouses which receive grain for storage before such grain has been inspected, and which are situated on the right of way of a railway or on any siding or spur track connected therewith, depot grounds, or any lands required or reserved by any railway company to be used in connection with its line of railway at any station or siding. No owner or lessee of a country elevator is permitted to ship, store, or handle any grain in or from such elevator unless he has first procured from the board of grain commissioners a license for such purpose. Country elevators which are used exclusively for the purposes of receiving, preparing, and shipping seed grain which is the property of the owner or operator of such elevator are not required to store grain therein for any person other than such owner or operator, and they are relieved from certain other provisions of the act applying particularly to country elevators handling grain belonging to other persons. Elevators receiving public grain are obligated to deliver to the owner of the grain a warehouse receipt specifying the net weight, the dockage or dirt, and the grade of such grain. The person operating the elevator is required to insure the grain so received against loss by fire while in storage, and to furnish the person delivering the grain either a cash purchase ticket, warehouse storage receipt, as already indicated, or a storage receipt for special-binned grain for each individual load, lot, or parcel delivered. The operator of the elevator is also obligated, upon the

receipt and payment of all legal charges for insuring, storing, and delivering or otherwise handling such grain, to deliver to the person on whose account it has been taken into store, or to his order, in quantities not less than carload lots, on track at any terminal elevator in the western inspection division on the line of the railway upon which the receiving country elevator is situated, or any line connecting therewith, as soon as the transportation company delivers the same at such terminal and the certificate of grade and weight is returned. The cash purchase tickets may be redeemed within 24 hours after their issue or exchanged for warehouse receipt. Numerous provisions are contained in the act, designed to protect the interest of the producer in his dealings with grain buyers and country elevators.

Public elevator.—Under this class is included every elevator or warehouse which receives grain for storage from the western inspection division after such grain has been inspected in accordance with the provisions of the Canada grain act. This inspection refers to the official Government inspection at Winnipeg or at a point within the western division. The western inspection division consists of the Provinces of Manitoba, Saskatchewan, Alberta, and British Columbia; the Northwest Territories; and that portion of the Province of Ontario lying west of and including the city of Port Arthur.

Eastern elevator.—This term includes every elevator or warehouse at any point in the eastern inspection division, used only for the storage of grain grown in that division, after inspection of such grain under this act, or if such grain, after being stored in such elevator, is subject to inspection under this act on delivery out of such elevator. The eastern inspection division consists of that portion of Ontario lying east of the city of Port Arthur and the Provinces of Quebec, New Brunswick, Nova Scotia, and Prince Edward Island. Since much the larger share of the Canadian grain is produced in the western inspection division and such grain is not subject to official inspection east of Port Arthur, this report is not materially concerned with the procedure involved at elevators falling under the class of "eastern elevators."

Terminal elevator.—This term includes every public or private elevator or warehouse which receives or ships grain and is located at any point declared by the governor in council to be a terminal. The proprietor, lessee, or manager of a terminal elevator is required to procure a license and to conduct his business as a public warehouseman in accordance with the law and the rules and regulations prescribed by the board of grain commissioners. As the public terminal elevators are operated wholly in the public interest, in no case whatever in a public elevator shall grain of different grades be mixed together while in store. Terminal warehouses in the western inspection division, however, are required to clean all grain received by them on which the inspector has set dockage for cleaning, except

State Geological Survey

rejected grades and "no grades," which are cleaned only on request of the owner.

Every terminal elevator is required to receive for storage any grain tendered in a dry and suitable condition for warehousing in the usual manner in which terminal elevators are accustomed to receive grain in the ordinary, usual course of business. Grain so received is inspected and graded by a duly authorized inspector and stored with grain of a similar grade.

The terminal elevators of the upper lake system have all been built at Fort William and Port Arthur. The term has been applied not because they are at the physical terminus of the rail lines carrying grain to the Lakes, but because the inspection of western grain ends at this point.

Reconditioning and cleaning.—Public elevators or warehouses must clean or specially treat rejected or damaged grain, and be equipped with special machinery for that purpose. Grain may be specially binned at a terminal elevator where it is found to be out of condition upon arrival or where it has gone out of condition after arrival. All elevators are required to do all in their power to protect grain from injury or deteriorating while at the elevator. Grain shipped out from an elevator is inspected and graded at the request of the owner or possessor thereof. The grade so determined becomes official.

Manufacturing elevator.—This term includes every elevator or warehouse used or operated as part of any plant engaged in the manufacture of grain products in the western inspection division.

Private elevator.—This includes every elevator which is licensed under the rules and regulations of the Board of Grain Commissioners. Grain received into such elevators must be the property of the elevator proprietor, with the exception that grain may be received in such elevators when the written consent of the owner is obtained.

Tables Nos. 50 and 51 show the number, capacities, and distribution by provinces of the several classes of elevators in Canada and the quantities of grain shipped through the several classes of elevators.

TABLE No. 50.—*Grain elevators in Canada, August 31, 1929*

	Number	Storage capacity
British Columbia:		*Bushels*
Public terminal elevators	2	3,100,000
Private elevators	16	11,007,000
Manufacturing elevators	6	275,150
Country elevators	1	15,000
Total	25	14,397,150
Alberta:		
Public terminal elevators	2	5,000,000
Private elevators	17	3,423,000
Manufacturing elevators	3	710,000
Country elevators	1,597	59,576,500
Total	1,619	68,709,500

TABLE No. 50.—*Grain elevators in Canada, August 31, 1929*—Continued

	Number	Storage capacity
		Bushels
Saskatchewan:		
Public terminal elevators	2	7,000,000
Private elevators	4	2,510,000
Manufacturing elevators	2	28,000
Country elevators	3,138	99,514,030
Total	3,146	109,052,030
Manitoba:		
Private elevators	14	4,015,000
Manufacturing elevators	5	1,362,000
Country elevators	746	24,151,900
Total	765	29,528,900
Ontario:		
Public terminal elevators	4	22,967,210
Private elevators	31	65,530,000
Manufacturing elevators	2	195,000
Country elevators	1	40,000
Total	38	88,732,210
Total, western grain inspection division:		
Public terminal elevators	10	38,067,210
Private elevators	82	86,485,000
Manufacturing elevators	18	2,570,150
Country elevators	5,483	183,297,430
Total	5,593	310,419,790
Ontario (east of Port Arthur), public elevators	15	31,150,000
Quebec, public elevators	7	20,312,000
New Brunswick, public elevators	3	2,200,000
Nova Scotia, public elevators	1	1,000,000
Total, eastern grain inspection division, public elevators	26	54,662,000
Grand total	5,619	365,081,790

Source: Board of Grain Commissioners for Canada.

TABLE No. 51.—*Canadian grain received by Canadian elevators during the crop year 1928–29*

[Quantities in bushels]

	Wheat	Oats	Barley	Flaxseed	Rye	Other	Total
Receipts at country elevators:							
Manitoba	32,001,532	6,329,325	22,943,272	356,979	1,112,704	----------	62,743,812
Saskatchewan	272,535,224	23,645,437	17,975,809	2,452,667	5,937,374	----------	322,546,511
Alberta	141,820,010	16,348,800	3,830,399	44,903	1,310,482	----------	163,354,594
Total	446,356,766	46,323,562	44,749,480	2,854,549	8,360,560	----------	548,644,917
Receipts at private and manufacturing elevators:							
Street grain	2,179,962	335,574	104,420	24,119	30,462	----------	2,674,537
Car-lot grain	55,180,860	11,623,716	6,570,116	549,703	362,142	----------	74,286,537
Total	57,360,822	11,959,290	6,674,536	573,822	392,604	----------	76,961,074
Receipts at interior terminal elevators:							
Calgary, Alberta	3,774,090	181,608	39,683	150	52,131	----------	4,047,662
Edmonton, Alberta	2,836,914	445,596	17,739	599	11,971	----------	3,312,819
Moose Jaw, Saskatchewan	3,717,870	77,094	27,310	111,172	17,554	----------	3,951,000
Saskatoon, Saskatchewan	3,428,365	94,823	5,314	6,900	1,169	----------	3,536,571
Total	13,757,239	798,521	90,046	118,821	82,825	----------	14,847,452

TABLE No. 51.—*Canadian grain received by Canadian elevators during the crop year 1928–29*—Continued

[Quantities in bushels]

	Wheat	Oats	Barley	Flaxseed	Rye	Other	Total
Platform loadings:							
Manitoba	7,673,602					6,736,061	14,409,663
Saskatchewan	8,450,736					1,599,130	10,049,866
Alberta	5,865,243					917,851	6,783,094
British Columbia	45,629					17,182	62,811
Total	22,035,210					9,270,224	31,305,434
Receipts at Vancouver, British Columbia elevators:							
Public terminal elevator	8,118,482	3,861			28,201		8,150,544
Private and manufacturing elevators	89,185,496	791,852	564,000	1,778	317,979		90,861,105
Total	97,303,978	795,713	564,000	1,778	346,180		99,011,649
Receipts at Victoria, British Columbia: Public terminal elevator	146,618		46,820				193,438
Receipts at Prince Rupert, British Columbia: Private elevator	2,499,393	1,653					2,501,046
Receipts at Fort William-Port Arthur elevators:							
Public terminal elevators	68,532,467	7,074,125	7,653,867	1,252,170	1,859,097		86,371,726
Private elevators	251,923,463	24,522,911	37,362,264	1,094,070	6,263,619		321,166,327
Total	320,455,930	31,597,036	45,016,131	2,346,240	8,122,716		407,538,053

Source: Board of Grain Commissioners for Canada.

RECEIVING GRAIN AT UPPER LAKE TERMINALS

Grain sold at the Winnipeg Grain Exchange is on the basis of delivery at Fort William and Port Arthur. The car of grain after having been sampled at Winnipeg is resealed and sent to Fort William and Port Arthur preceded by copy of its grade certificate, the original of the latter document having been sent by the inspection department to the owner of the grain and with thousands of others passed through the hands of grain brokers or agents into the Winnipeg grain market. On arrival of the cars of grain at Fort William and Port Arthur they are rechecked by Government officials in order to prevent any possibility of error, whether in actual grading or in transcribing information. Here the contents of the cars in reference to load lines are also noted, checking the Winnipeg notations in reference to them. In case a car has leaked en route and shows load lines below the record made at Winnipeg, the loss is chargeable to the railway. After the car is rechecked as to grade and load lines it is sent to the elevator to which it is consigned and there unloaded, weighed, cleaned, or dried if necessary, all under the direct supervision of Government officials who issue reports as to the weight. These weight certificates are sent to the owner who attaches the grade certificate issued at Winnipeg and the railway bill of lading

issued when the car was loaded, these three documents making the history of the car complete as to ownership, grade, and weight. They are eventually combined in one document, the warehouse receipt, which is negotiable and serves as a basis of financing the operation.

Any grain inspected at Winnipeg or other western point may be reinspected at Fort William or other terminal elevator in the division without additional charge; but grain not inspected west of Fort William shall be inspected at that point.

POOLING OF SHIPMENTS

The facilities of the various elevators at the upper lake ports for unloading from cars and loading to vessels are described in detail under each port. The remarkable records accomplished at Port Arthur and Fort William, both with respect to unloading from cars and loading to ships, have been made possible through the system of pooling which has been successfully carried out by the Lake Shippers Clearance Association. This is a mutual association organized by the grain shippers. It operates as a clearance house for grain documents, combining all the documents of the different shippers so as to give vessels the maximum dispatch in loading. The methods employed by this association are worthy of a brief description, as they permit a degree of efficiency to be secured which by the very nature of things would be lacking if each shipment were handled independently.

Warehouse receipts issued by any elevator under the authority of the board of grain commissioners for Canada and acceptable at the grain exchange may be tendered in satisfaction of any purchase of grain made in the grain market. Consequently when a shipper buys a cargo of several hundred thousand bushels he is likely to have delivered to him warehouse receipts of every public elevator on the water front. Without the clearing system provided by the association the shipper would have to send his boat to every elevator against which he held warehouse receipts, thus causing serious loss of time to the boat, which would have to be reflected in demurrage charges and higher freight rates. Such was actually the condition when the Lake Shippers Clearance Association was created. With the system now in effect the shipper holding warehouse receipts for a given quantity of grain of specified grade is able to make arrangements through the clearing house manager to secure this grain from any elevator at Fort William and Port Arthur having the requisite quantity in store.

The Lake Shippers Clearance Association also assists materially in facilitating the inward movement of grain by rail to upper lake

ports during the fall season which depends so much upon the speed with which cars can be unloaded at the terminals and returned to interior points. The association, handling as it does all the outward shipments and having on call at the terminal elevators large quantities of grain at all times, is able to place boats at elevators which are full and which would otherwise have to suspend receiving grain for lack of space. In this way it is able to keep all elevators on a working basis both with respect to unloading from cars and loading out to ships, thus maintaining the capacity of the port at its maximum at all times. The association takes delivery of the warehouse receipts in its office in Winnipeg; records them in books under their several grades and elevators; wires the necessary particulars to its Fort William office and to the several elevators concerned; receives the shipping orders from the shipper, loads the grain out according to the terms of the order; makes out the rail or vessel bills of lading in split quantities as required; obtains the Government weight and inspection certificates to correspond with bills of lading; makes out all customs papers, including export entries and consular invoices where required, and delivers all the documents covering the shipment complete to the shipper or the bank, as the case may be. It adjusts and pays all the elevator and other charges, and delivers to the shipper detailed manifest showing all charges against the shipment.

RECEIPTS AT UPPER LAKE PORTS

The enormous volume of grain flowing eastward over the Great Lakes to many foreign and domestic destinations is practically all handled through four ports, viz, Port Arthur-Fort William, Ontario, Duluth-Superior, Minn., Milwaukee, Wis., and Chicago, Ill. Small quantities are handled through Manitowoc, and Green Bay. The development of the important upper lake ports as points for the transshipment of grain from rail to lake carriers is an interesting chapter in our transportation history. This report, however, is confined to the presentation of information relative to the traffic during the period 1920–1928, inclusive.

Through the courtesy and cooperation of the Canadian Government and the local authorities at the ports it has been possible to secure fairly uniform data covering the nine calendar years mentioned, as well as valuable information regarding the facilities at the various ports and the conditions affecting grain movements through them.

ORIGIN OF GRAIN RECEIVED AT UPPER LAKE PORTS

In order to indicate clearly the extent and importance of the grain territory served by the Great Lakes, efforts have been made to secure for the calendar year 1928 figures showing the quantities of each

kind of grain received at each of the upper lake ports from the principal States and Provinces contributing to the lake grain movement.

Canadian grain.—So far as Canadian grain is concerned the lake route has an advantage over any other route to easterly destinations. The same is true with respect to grain originating in Minnesota and the Dakotas, but it does not apply to the same extent to grain originating throughout the Central West. The latter grain has the choice of several routes and the lake route is not the cheapest for all movements.

Precise figures of the quantities of grain received at Fort William-Port Arthur from each of the prairie Provinces are not of record. The receipts, however, came almost entirely from Manitoba, Saskatchewan, and Alberta. The production of British Columbia moves principally to Vancouver. Since the local requirements in these prairie Provinces are small and the larger part of the grain enters the channels of trade focusing directly upon the port of Fort William-Port Arthur, it has been deemed sufficient for the purposes of this study to present an estimate of the amounts originating in the three contributing Provinces, based upon their production during 1928. Table No. 52 shows that for the year in question 55.4 per cent of the grain received at Fort William-Port Arthur originated in Saskatchewan, 34.5 per cent in Alberta, and 10.1 per cent in Manitoba.

TABLE NO. 52.—*Origin of grain received at Fort William and Port Arthur during the calendar year 1928*

[In thousands of bushels]

From—	Wheat	Oats	Barley	Rye	Total	Per cent of total
Alberta	120,763	9,720	10,124	3,793	144,400	34.5
Saskatchewan	197,917	16,619	13,499	4,192	232,227	55.4
Manitoba	16,773	5,016	18,562	1,996	42,347	10.1
Total	335,453	31,355	42,185	9,981	418,974	100.0

NOTE.—The above is an estimate only, based upon production. Exact figures are not available.

United States grain.—Table No. 53 showing the origin of grain received at Duluth-Superior has been compiled from data furnished through the courtesy of the rail lines serving the port and from the statistics of water-borne commerce compiled by the Corps of Engineers United States Army. It will be noted that wheat constituted over two-thirds of the total grain received at the port, followed by barley, rye, flax, oats, and corn. About two-thirds of the total receipts came from the State of North Dakota, with Minnesota and Montana ranking next in importance.

TABLE NO. 53.—*Origin of grain received at Duluth-Superior during the calendar year 1928*

[Quantities in bushels]

Originating States	Wheat	Corn	Rye	Oats	Barley	Flax	Total
Illinois	18,833						18,833
Wisconsin	6,767					52,143	58,910
Minnesota	8,081,817	340,054	3,849,701	1,741,092	6,068,235	933,044	21,013,943
Iowa	641,833	21,089	3,893	23,750	23,500		714,065
Missouri	19,400						19,400
North Dakota	79,239,293	25,442	8,556,615	1,036,046	17,445,451	4,440,852	110,743,699
South Dakota	5,864,566	299,036	230,112	128,738	6,368,641	68,771	12,959,864
Nebraska	390,700	1,268			1,792		393,760
Kansas	29,067	1,214					30,281
Montana	15,987,467		819,114	27,725	83,611	688,942	17,606,859
Wyoming	35,167						35,167
Colorado	87,533						87,533
Oklahoma	19,533						19,533
Washington	4,300				6,125		10,425
Canada	853,216		16,888	12,103	598,439	5,508	1,486,154
Origin unknown	453,467	451,974	23,589	83,063	241,917	80,429	1,334,439
Total receipts	111,732,959	1,140,077	13,499,912	3,052,517	30,837,711	6,269,689	166,532,865

Table No. 54, covering the origin of grain received at Milwaukee, makes apparent an important difference in the territory served by this port as compared with Duluth-Superior, and also a considerable difference in the kinds of grain handled. The State of Iowa was the largest contributor of grain, followed by South Dakota and Minnesota, with smaller amounts from several other States. Corn was the most important grain handled, followed in importance by barley, oats, wheat, rye, and flaxseed. The origin of the flaxseed received at Milwaukee is not definitely known. The bulk of the wheat received at Milwaukee came from the States of Kansas and South Dakota, whereas the receipts of this grain at Duluth-Superior came mainly from North Dakota and Montana.

TABLE NO. 54.—*Origin of grain received at Milwaukee, 1928*

[Quantities in bushels]

From	Wheat	Oats	Corn	Barley	Rye	Total	Per cent of total grain
Wisconsin	338,280	200,000	300,000	784,860	435,502	2,058,642	4.5
Minnesota	315,090	2,131,155	2,272,509	4,023,000	461,501	9,203,255	20.2
Iowa	151,980	5,000,852	9,803,113	3,000,100	13,778	17,969,823	39.4
Illinois			752,278			752,278	1.6
Nebraska	240,128		1,565,725			1,805,853	3.9
South Dakota	936,663	633,893	2,667,695	5,800,200	213,679	10,252,130	22.5
North Dakota	602,053			580,000		1,182,053	2.6
Kansas	2,422,706					2,422,706	5.3
Total	5,006,900	7,965,900	17,361,320	14,188,160	1,124,460	[1]45,646,740	100.0

[1] Does not include 949,800 tons of flaxseed.

Table No. 55 shows the origin by States of that portion of the grain received at Chicago billed for movement via lake during the calendar year 1928. It does not include the immense quantities of grain received by rail and intended for rail shipment, as the magnitude

of the movement and the work involved in tracing the origin by States rendered such a compilation impracticable. The information on which this table was based was secured from the original bills of lading. This table shows that 28,017,043 bushels of grain were received by rail for lake shipment. Table No. 68 shows that 29,030,000 bushels of grain were actually shipped by lake during the calendar year 1928. The difference may be accounted for by the shipments of grain from storage or of grain not originally billed for through movement by water. The total receipts of grain at Chicago in 1928, as shown by Table No. 59, amounted to 232,347,000 bushels.

TABLE No. 55.—*Origin by States of grain received at Chicago, via rail, and forwarded from Chicago via lake during the calendar year 1928*

[Quantities in bushels]

State	Corn	Wheat	Oats	Barley	Rye	Grand total
Illinois	6,009,725	1,900,004	3,774,128	804,992	20,686	12,509,535
Iowa	4,727,575	283,297	1,921,763	611,838	36,060	7,580,533
Missouri	1,621,597	876,893	5,686	----------	24,054	2,528,230
Minnesota	237,052	673,991	124,203	80,491	374,170	1,489,907
Nebraska	690,196	174,080	----------	35,046	15,457	914,779
Indiana	385,909	51,417	762,560	17,993	1,172	1,219,051
Wisconsin	464,164	24,844	255,168	5,349	27,662	777,187
South Dakota	239,661	8,230	52,997	186,753	14,484	502,125
Kansas	92,244	300,182	----------	----------	----------	392,426
Oklahoma	2,827	43,983	----------	----------	----------	46,810
Texas	----------	43,613	----------	----------	----------	43,613
North Dakota	1,565	1,003	----------	----------	6,156	8,724
Idaho	1,141	1,499	----------	----------	----------	2,640
Kentucky	1,483	----------	----------	----------	----------	1,483
Total	14,475,139	4,383,036	6,896,505	1,742,462	519,901	28,017,043

RECEIPTS BY PORTS AND KINDS OF GRAIN

Tables Nos. 56, 57, 58, and 59 show the receipts of grain at the upper lake ports during the period 1920–1928, segregated by kinds of grain, with an average for the period. Table No. 60 shows the total receipts at all the upper lake ports combined during the period. The year 1928 is distinguished as the banner year for receipts of grain at upper lake ports. This is accounted for by the unusually large Canadian grain crop, which resulted in a greatly increased movement of grain, particularly of wheat and barley, to Fort William-Port Arthur in that year. The average receipts of all grain at upper lake ports for the 9-year period amounted to 726,397,239 bushels. Disregarding the year 1920, which is not fairly representative of the movement through either United States or Canadian ports, the average for the remaining eight years amounts to 752,374,778 bushels. Fort William-Port Arthur ranked first in the total amount of grain received during the period, followed by Chicago, Duluth-Superior, and Milwaukee. More wheat and barley were received at Fort William-Port Arthur than at any of the other upper lake ports; more oats and corn at Chicago; while Duluth-Superior received more rye than any other upper lake port.

TABLE NO. 56.—*Grain receipts at Fort William-Port Arthur, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total [1]
1920	137, 509, 588	27, 351, 713	255, 439	8, 793, 040	2, 269, 653	2, 977, 387	179, 156, 820
1921	173, 364, 496	51, 005, 550	793, 723	12, 959, 771	3, 518, 179	4, 107, 168	245, 748, 887
1922	244, 354, 544	35, 410, 860	98, 536	15, 511, 333	10, 871, 465	2, 975, 917	309, 222, 655
1923	273, 679, 363	38, 283, 404	----------	15, 131, 698	7, 399, 786	3, 958, 061	338, 452, 312
1924	187, 901, 375	51, 609, 803	----------	27, 353, 245	6, 904, 450	6, 247, 468	280, 016, 341
1925	249, 795, 846	39, 679, 384	----------	33, 560, 500	4, 604, 245	6, 143, 464	333, 783, 439
1926	233, 865, 226	24, 515, 753	----------	34, 985, 466	6, 970, 521	4, 099, 564	304, 436, 530
1927	251, 213, 158	11, 095, 364	----------	26, 529, 844	10, 278, 289	3, 496, 289	302, 612, 944
1928	335, 453, 445	31, 355, 390	----------	42, 185, 805	9, 981, 506	3, 177, 056	422, 153, 202
Average	231, 904, 116	34, 478, 580	127, 522	24, 112, 300	6, 977, 566	4, 131, 375	301, 731, 459

[1] Does not include mixed grains of which 1,236,336 bushels were received in 1923, 921,384 in 1924, 1,688,431 in 1925, 844,410 in 1926, 650,684 in 1927, and 1,758,428 in 1928.

TABLE NO. 57.—*Grain receipts at Duluth-Superior, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	42, 620, 276	3, 163, 361	13, 202	3, 420, 440	19, 959, 589	5, 183, 791	74, 360, 659
1921	55, 022, 858	6, 425, 037	6, 771, 498	5, 078, 115	13, 400, 013	4, 493, 868	91, 191, 389
1922	56, 159, 632	3, 823, 437	12, 257, 147	4, 471, 029	39, 148, 245	4, 047, 914	119, 912, 404
1923	50, 471, 068	3, 093, 198	2, 012, 469	4, 278, 700	20, 445, 629	7, 275, 086	87, 576, 150
1924	100, 618, 406	20, 750, 654	7, 875, 110	12, 751, 938	41, 576, 687	15, 830, 990	199, 403, 785
1925	75, 413, 657	23, 937, 520	686, 183	16, 724, 764	12, 160, 387	10, 116, 894	139, 039, 405
1926	51, 783, 706	9, 798, 153	123, 696	5, 882, 639	9, 912, 155	7, 628, 108	85, 128, 457
1927	111, 529, 393	786, 919	133, 341	23, 127, 427	27, 818, 864	10, 598, 720	173, 994, 664
1928	111, 732, 959	3, 052, 517	1, 140, 077	30, 837, 711	13, 499, 912	6, 269, 689	166, 532, 865
Average	72, 816, 884	8, 315, 088	3, 445, 858	11, 841, 418	21, 991, 276	7, 938, 340	126, 348, 864

TABLE NO. 58.—*Grain receipts at Milwaukee, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	3, 470, 461	23, 265, 505	15, 937, 110	9, 015, 730	4, 581, 885	591, 750	56, 862, 441
1921	8, 893, 255	19, 456, 070	29, 900, 355	9, 711, 045	2, 560, 455	723, 426	71, 244, 606
1922	2, 871, 025	22, 851, 190	23, 962, 245	9, 491, 090	2, 915, 425	723, 376	62, 814, 351
1923	3, 092, 630	25, 936, 490	18, 679, 185	9, 286, 120	2, 305, 410	883, 014	60, 182, 849
1924	9, 236, 365	19, 464, 450	13, 534, 450	11, 454, 140	2, 810, 195	714, 635	57, 244, 235
1925	4, 614, 720	16, 563, 280	8, 164, 345	11, 849, 210	925, 952	824, 228	42, 941, 735
1926	7, 449, 205	13, 823, 110	7, 642, 060	8, 952, 460	1, 128, 611	811, 233	39, 806, 679
1927	6, 458, 571	13, 607, 200	1, 765, 980	9, 850, 940	1, 070, 155	1, 109, 959	33, 862, 805
1928	5, 006, 900	7, 965, 900	17, 361, 320	14, 188, 160	1, 124, 460	949, 800	46, 596, 540
Average	5, 677, 015	18, 103, 688	15, 219, 672	10, 422, 099	2, 158, 051	814, 602	52, 395, 138

TABLE NO. 59.—*Grain receipts at Chicago, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	28, 997, 000	74, 939, 000	85, 487, 000	11, 289, 000	6, 325, 000	1, 160, 000	208, 197, 000
1921	45, 700, 000	82, 729, 000	182, 982, 000	7, 763, 000	4, 215, 000	969, 000	324, 358, 000
1922	57, 850, 000	87, 141, 000	193, 271, 000	9, 938, 000	5, 534, 000	905, 000	354, 639, 000
1923	52, 489, 000	75, 106, 000	105, 505, 000	9, 835, 000	5, 380, 000	1, 016, 000	249, 331, 000
1924	69, 012, 000	82, 831, 000	99, 524, 000	11, 461, 000	9, 672, 000	1, 985, 000	274, 485, 000
1925	28, 244, 000	53, 547, 000	83, 557, 000	9, 833, 000	5, 895, 000	2, 152, 000	183, 228, 000
1926	38, 113, 000	47, 243, 000	92, 710, 000	9, 032, 000	2, 163, 000	2, 274, 000	191, 535, 000
1927	42, 710, 000	49, 066, 000	86, 021, 000	10, 688, 000	3, 793, 000	2, 898, 000	195, 176, 000
1928	37, 152, 000	53, 760, 000	117, 775, 000	16, 459, 000	4, 841, 000	2, 360, 000	232, 347, 000
Average	44, 474, 000	67, 374, 000	116, 315, 000	10, 700, 000	5, 313, 000	1, 747, 000	245, 922, 000

TABLE No. 60.—*Grain receipts at upper lake ports, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	212, 597, 325	128, 719, 579	101, 692, 751	32, 518, 210	33, 136, 127	9, 912, 928	518, 576, 920
1921	282, 980, 609	159, 615, 657	220, 447, 576	35, 511, 931	23, 693, 647	10, 293, 462	732, 542, 882
1922	361, 235, 201	149, 231, 487	229, 588, 928	39, 411, 452	58, 469, 135	8, 652, 207	846, 588, 410
1923	379, 732, 061	142, 419, 092	126, 196, 654	38, 531, 518	35, 530, 825	13, 132, 161	735, 542, 311
1924	366, 768, 146	174, 655, 907	120, 963, 560	63, 020, 323	60, 963, 332	24, 778, 093	811, 149, 361
1925	358, 068, 223	133, 727, 184	92, 407, 528	71, 967, 474	23, 585, 584	19, 236, 586	698, 992, 579
1926	331, 211, 137	95, 380, 016	100, 475, 756	58, 852, 565	20, 174, 287	14, 812, 905	620, 906, 666
1927	411, 911, 122	74, 555, 483	87, 920, 321	70, 196, 211	42, 960, 308	18, 102, 968	705, 646, 413
1928	489, 345, 304	96, 133, 807	136, 276, 397	103, 670, 676	29, 446, 878	12, 756, 545	867, 629, 607
Average	354, 872, 125	128, 270, 913	135, 107, 719	57, 075, 595	36, 440, 014	14, 630, 873	726, 397, 239

RECEIPTS BY WATER AND RAIL

The several upper lake ports are important primary markets receiving grain directly by rail from interior country elevators as well as from other primary markets and points of accumulation. During the 9-year period 1920 to 1928, inclusive, 99 per cent of the grain received at upper lake ports came by rail. Fort William-Port Arthur received no grain by water during this period; Milwaukee received an average of 99,662 tons of flaxseed per year by water during the period; and receipts by water at Chicago were largely composed of flaxseed. Most of the water receipts at upper lake ports were credited to Duluth-Superior, with Chicago ranking a close second in the amount received by water, while a smaller amount entered Milwaukee.

TABLE No. 61.—*Grain receipts at upper lake ports, 1920–1928, by water and rail*

[Quantities in bushels]

BY WATER

Year	Fort William-Port Arthur	Duluth-Superior	Milwaukee	Chicago	Total	Per cent
1920	----------	6, 947, 304	[1] 68, 120	2, 327, 998	9, 343, 422	1. 8
1921	----------	3, 255, 471	[1] 1, 380	623, 765	3, 880, 616	0. 5
1922	----------	4, 575, 295	[1] 90, 000	2, 242, 251	6, 907, 546	0. 8
1923	----------	8, 426, 557	----------	1, 882, 000	10, 308, 557	1. 4
1924	----------	2, 172, 436	[1] 102, 165	[1] 5, 866, 557	8, 141, 158	1. 4
1925	----------	2, 790, 669	[1] 163, 768	[1] 7, 880, 046	10, 834, 483	1. 6
1926	----------	1, 616, 473	[1] 163, 788	[1] 1, 228, 071	3, 008, 332	0. 5
1927	----------	1, 302, 013	[1] 204, 939	[1] 2, 155, 048	3, 662, 000	0. 5
1928	----------	1, 917, 500	[1] 102, 802	[1] 6, 075, 000	8, 095, 302	0. 9
Average	----------	3, 667, 080	99, 662	3, 364, 526	7, 131, 268	1. 0

BY RAIL

1920	179, 156, 820	67, 413, 355	56, 794, 321	205, 869, 002	509, 233, 498	98. 2
1921	245, 748, 887	87, 935, 918	71, 243, 226	323, 734, 235	728, 662, 266	99. 5
1922	309, 222, 655	115, 337, 109	62, 724, 351	352, 396, 749	839, 680, 864	99. 2
1923	338, 452, 312	79, 149, 593	60, 182, 849	247, 449, 000	725, 233, 754	98. 6
1924	280, 016, 341	197, 231, 349	57, 142, 070	268, 618, 443	803, 008, 203	98. 6
1925	333, 783, 439	136, 248, 736	42, 777, 967	175, 347, 954	688, 158, 096	98. 4
1926	304, 436, 530	83, 511, 984	39, 642, 891	190, 306, 929	617, 898, 334	99. 5
1927	302, 612, 944	172, 692, 651	33, 657, 866	193, 020, 952	701, 984, 413	99. 5
1928	422, 153, 202	164, 615, 365	46, 493, 738	226, 272, 000	859, 534, 305	99. 1
Average	301, 731, 459	122, 681, 784	52, 295, 476	242, 557, 252	719, 265, 971	99. 0

[1] Flaxseed.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

277,786 — 144,40 — 529,936 — 232,227 — 160,394 — 42,347

ALB. SASK. MAN. ORIGIN UNKNOWN

10

111,175 — 16,918 — 295,577 — 106,303

1,254 — 1,481 — CANADA — 20,081

PORT ARTHUR & FORT WILLIAM

LAKE SUPERIOR

DULUTH-SUPERIOR

1,182 — 9 — 386,358 — 7 — 9203 — 1,490 — 230,945 — 2059

WASH. MONT. N. DAK.

43,909 — 3 — 13,946 — 35 — 224,739 — 12,891 — 502 — 10,252

IDA. S. DAK. MINN.

LAKE MICHIGAN — MILWAUKEE — 134,264

LAKE HURON — LAKE ONTARIO — LAKE ERIE

714 — 394 — 379,060 — 915 — 1806 — 752,362 — 17,970 — 7,581 — WIS. — CHICAGO — MICH.

WYO. NEB. IOWA

88 — 57,183 — 30 — 412,859 — 2,423 — 392 — 19 — 246,304 — 2528 — 586,985 — 752 — 12,510 — 1,219 — 267,798 — 245,071

OHIO

IND.

COLO. KAN. MO. ILL. KEN.

20 — 47 — 44

OKLA.

TEXAS

79.2 %

PRODUCTION OF STATES & PROVINCES SHIPPING VIA THE GREAT LAKES 5,356,651

TOTAL PRODUCTION U.S. & CANADA 6,765,760 1928

PRODUCTION OF OTHER STATES & PROVINCES 1,409,109

20.8 %

EXPLANATION

Quantities are expressed in thousands of bushels. Figures in circles show total production. All other figures represent amounts moving to lake ports. Figures for Chicago represent only receipts via rail destined for lake movement.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS

ORIGIN OF GRAIN RECEIVED AT UPPER LAKE PORTS, 1928.

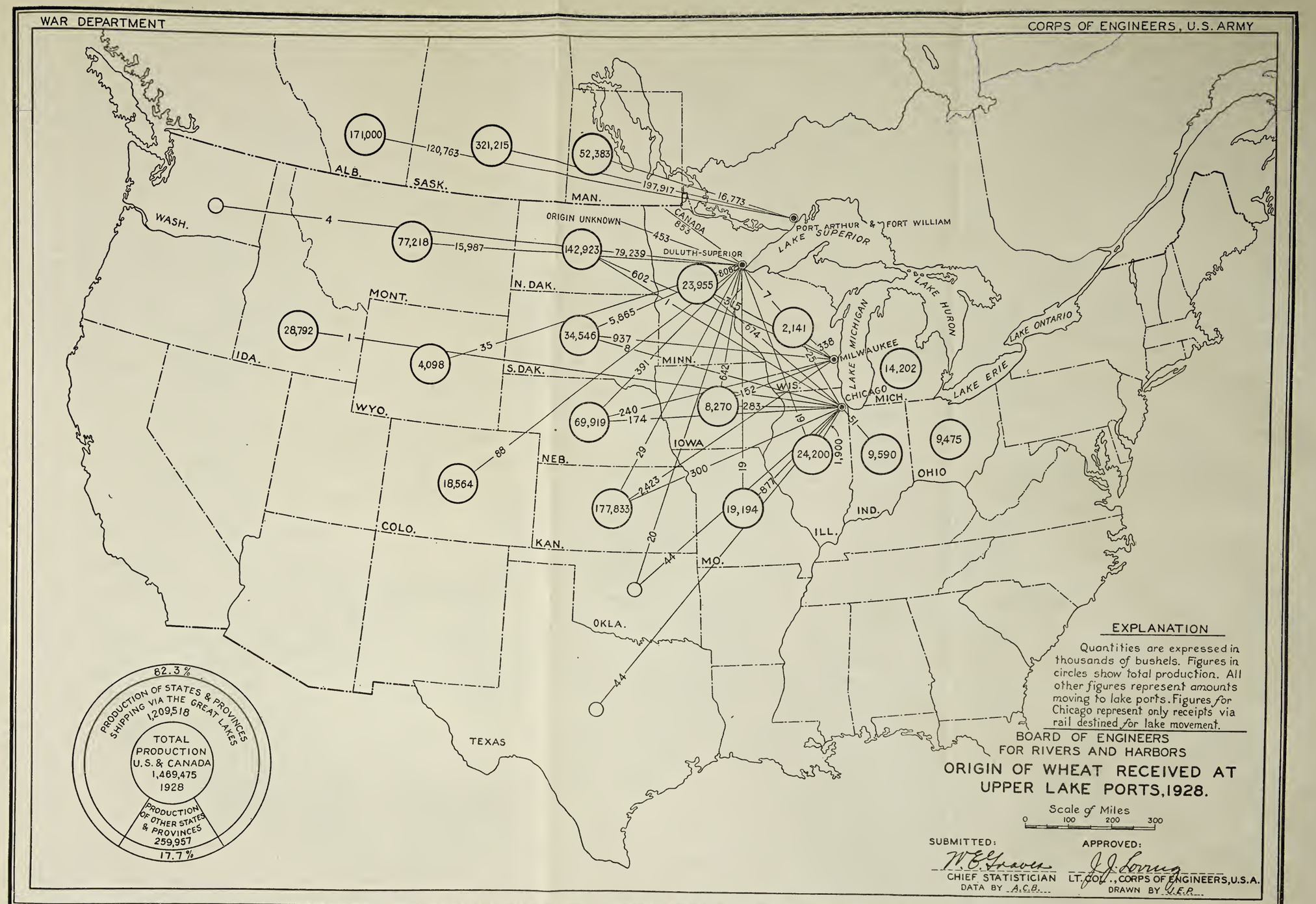
Scale of Miles 0 100 200 300

SUBMITTED: W. E. Graves — CHIEF STATISTICIAN — DATA BY A.C.B.

APPROVED: J. J. Loring — LT. COL., CORPS OF ENGINEERS, U.S.A. — DRAWN BY V.E.P.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



EXPLANATION

Quantities are expressed in thousands of bushels. Figures in circles show total production. All other figures represent amounts moving to lake ports. Figures for Chicago represent only receipts via rail destined for lake movement.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS

ORIGIN OF WHEAT RECEIVED AT UPPER LAKE PORTS, 1928.

Scale of Miles
0 100 200 300

SUBMITTED:
W. E. Graves
CHIEF STATISTICIAN
DATA BY A.C.B.

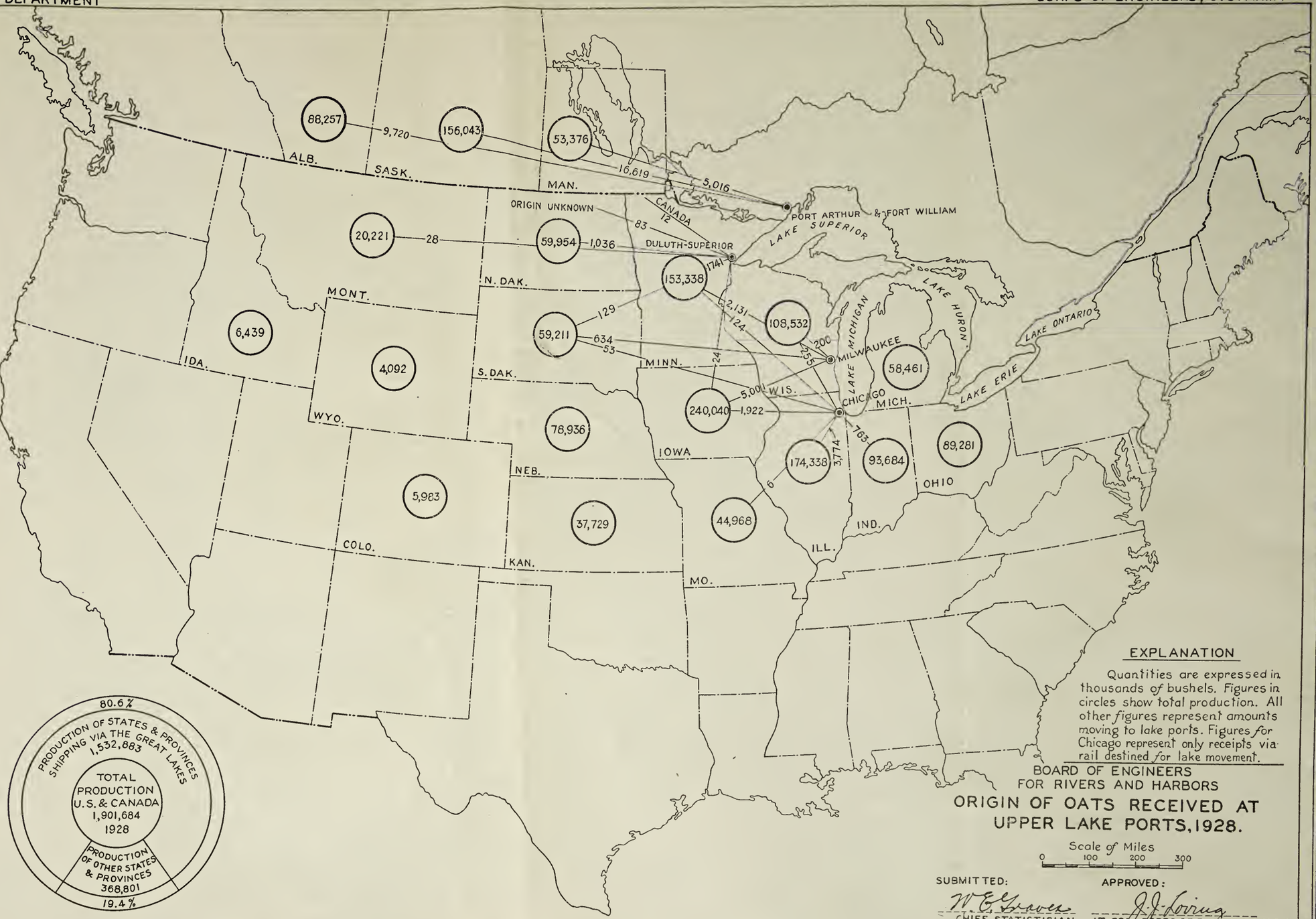
APPROVED:
J. J. Loring
LT. COL., CORPS OF ENGINEERS, U.S.A.
DRAWN BY U.E.P.

103996—30. (Face p. 110.) No. 2

ORIGIN
AK.
NE
AN

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



EXPLANATION

Quantities are expressed in thousands of bushels. Figures in circles show total production. All other figures represent amounts moving to lake ports. Figures for Chicago represent only receipts via rail destined for lake movement.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

ORIGIN OF OATS RECEIVED AT UPPER LAKE PORTS, 1928.

Scale of Miles
0 100 200 300

SUBMITTED:
W. E. Graves
CHIEF STATISTICIAN
DATA BY A.C.B.

APPROVED:
J. J. Loring
LT. COL., CORPS OF ENGINEERS, U.S.A.
DRAWN BY J.E.P.

103996—30. (Face p. 110.) No. 3

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

ALB. SASK MAN.

ORIGIN UNKNOWN 452

5,206

24,426 — 25 — DULUTH-SUPERIOR — 340 — 143,115

2

N. DAK.

MONT.

2,438 — 1 — 3,006

299

93,849 — 2,668 — 240

IDA.

S. DAK.

MINN.

21

2,273

237

91,203

300

464

MILWAUKEE

51,135

9,803

WIS.

CHICAGO

MICH.

476,012 — 4,728

1,566

212,701 — 690

752

690

386

WYO.

IOWA

367,488

161,322

136,725

NEB.

OHIO

18,694

92

179,118

1,622

181,540

3

IND.

ILL.

KEN.

COLO

KAN.

MO.

OKLA

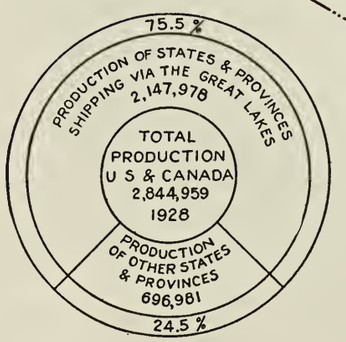
LAKE SUPERIOR

LAKE MICHIGAN

LAKE HURON

LAKE ONTARIO

LAKE ERIE



EXPLANATION

Quantities are expressed in thousands of bushels. Figures in circles show total production. All other figures represent amounts moving to lake ports. Figures for Chicago represent only receipts via rail destined for lake movement.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS

ORIGIN OF CORN RECEIVED AT UPPER LAKE PORTS, 1928.

Scale of Miles

0 100 200 300

SUBMITTED:

W. E. Travers
CHIEF STATISTICIAN

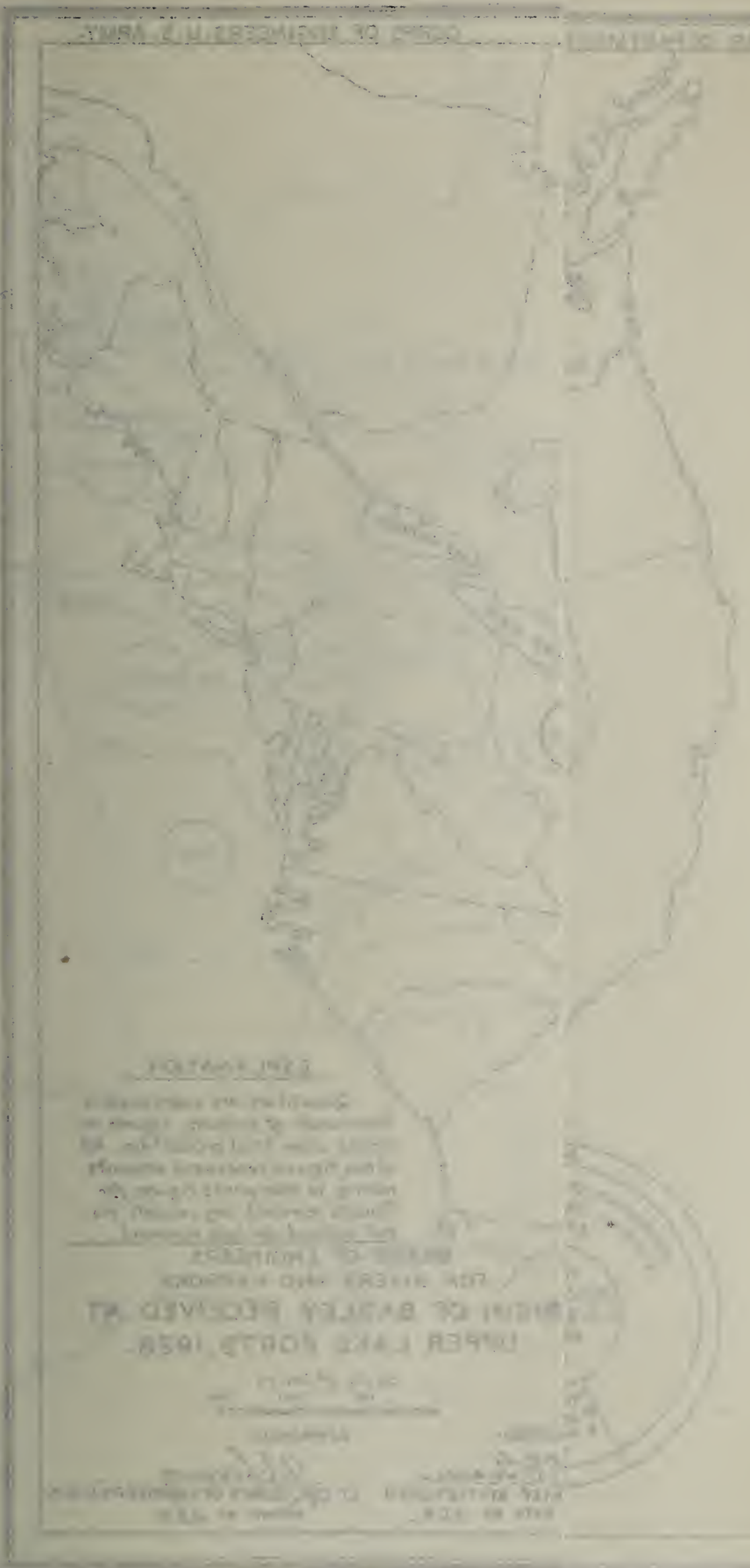
DATA BY A.C.B.

APPROVED:

J. J. Loring
LT. COL., CORPS OF ENGINEERS, U.S.A.

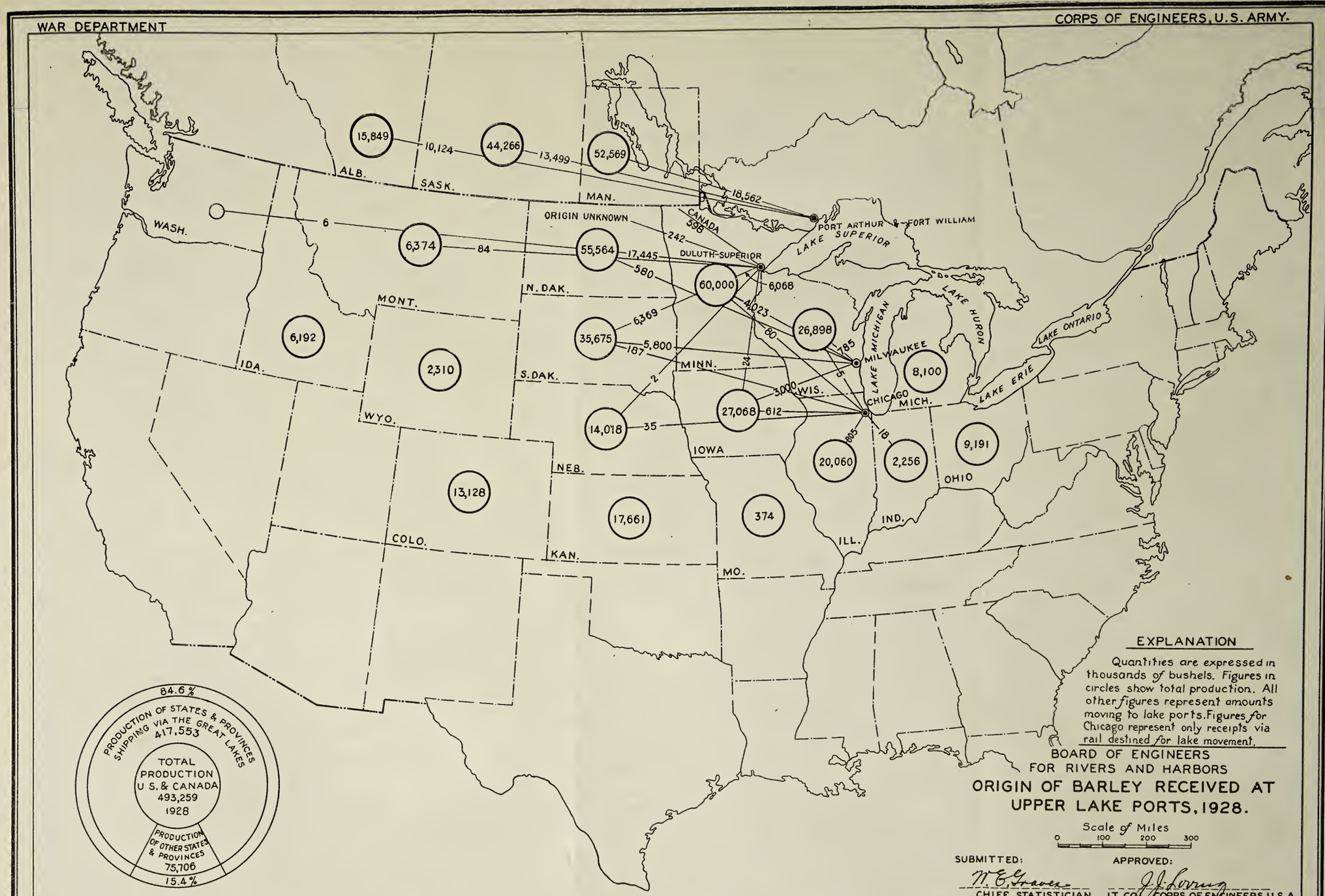
DRAWN BY J.C.P.

103996—30. (Face p. 110.) No. 4



WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.



84.6 %

PRODUCTION OF STATES & PROVINCES SHIPPING VIA THE GREAT LAKES 417,553

TOTAL PRODUCTION U.S. & CANADA 493,259 1928

PRODUCTION OF OTHER STATES & PROVINCES 75,706

15.4 %

EXPLANATION

Quantities are expressed in thousands of bushels. Figures in circles show total production. All other figures represent amounts moving to lake ports. Figures for Chicago represent only receipts via rail destined for lake movement.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS

ORIGIN OF BARLEY RECEIVED AT UPPER LAKE PORTS, 1928.

Scale of Miles 0 100 200 300

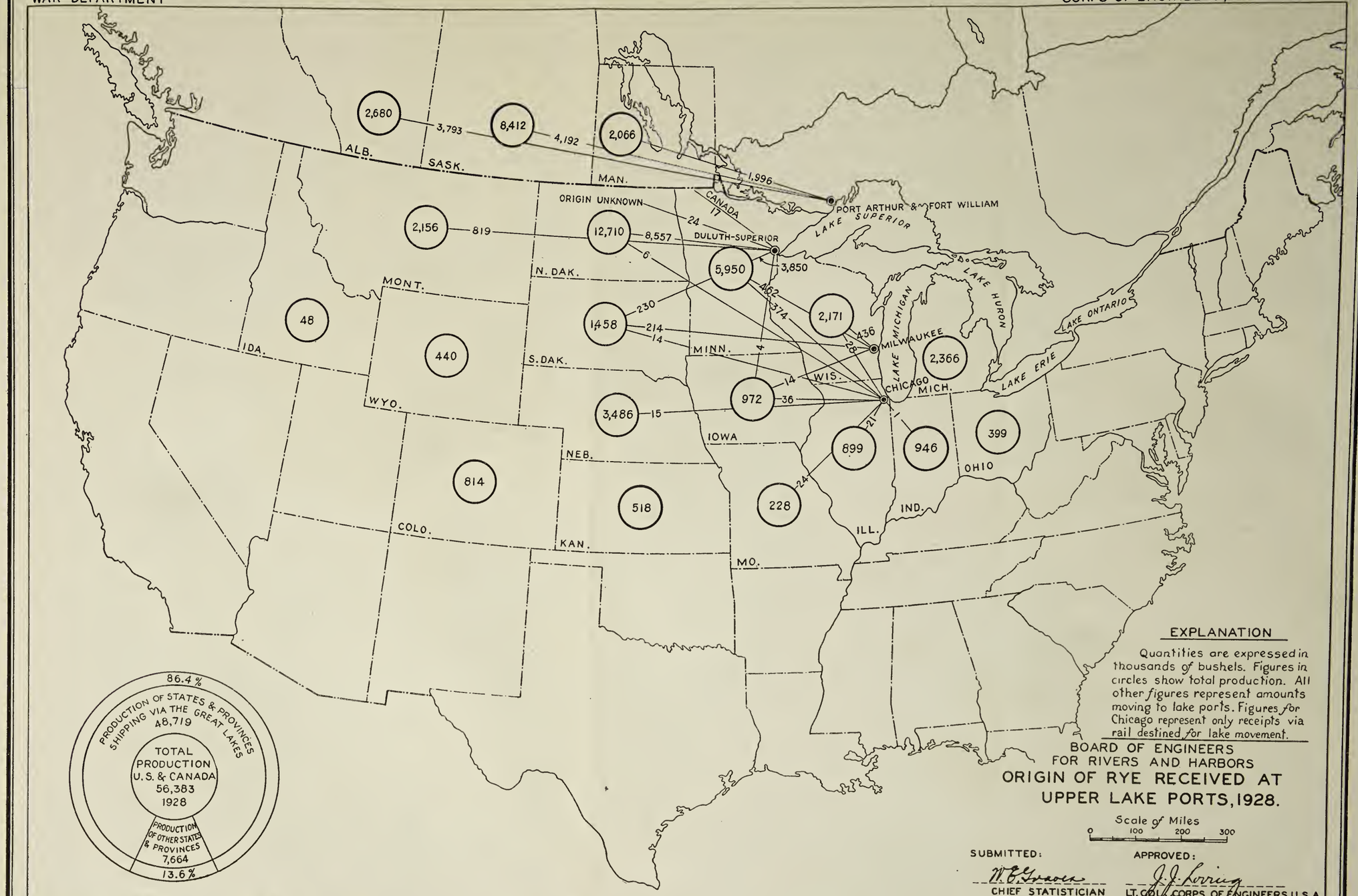
SUBMITTED: W. E. Graves, CHIEF STATISTICIAN, DATA BY A.C.B.

APPROVED: J. J. Loving, LT. COL., CORPS OF ENGINEERS, U.S.A., DRAWN BY J.E.P.

103996—30. (Face p. 110.) No. 5

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY



EXPLANATION

Quantities are expressed in thousands of bushels. Figures in circles show total production. All other figures represent amounts moving to lake ports. Figures for Chicago represent only receipts via rail destined for lake movement.

BOARD OF ENGINEERS FOR RIVERS AND HARBORS

ORIGIN OF RYE RECEIVED AT UPPER LAKE PORTS, 1928.

Scale of Miles
0 100 200 300

SUBMITTED:
W. E. Grace
CHIEF STATISTICIAN
DATA BY A.C.B.

APPROVED:
J. J. Loring
LT. COL., CORPS OF ENGINEERS, U.S.A.
DRAWN BY J.E.P.

103996—30. (Face p. 110.) No. 6

RECEIPTS BY NATIONALITY OF GRAIN

During the 9-year period 1920–1928 58 per cent of the grain received at upper lake ports originated in the United States and 42 per cent in Canada. Chicago led all ports in the receipt of United States grain with an average of 245,129,053 bushels annually. Over 99 per cent of the Canadian grain reaching the head of the lakes was received at Fort William-Port Arthur, although Duluth-Superior and Chicago also received Canadian grain. The Canadian grain received at Duluth-Superior came by both rail and water routes from Fort William-Port Arthur, while that at Chicago came by water from the same port. Canadian receipts at Chicago during the period were largely composed of flaxseed.

TABLE NO. 62.—*Grain receipts at upper lake ports, 1920–1928, by nationality of grain*

[Quantities in bushels]

UNITED STATES GRAIN

Year	Fort William-Port Arthur	Duluth-Superior	Milwaukee	Chicago	Total	Per cent
1920	----------	73,389,388	56,862,441	205,997,002	336,248,831	64.8
1921	----------	89,363,772	71,244,606	324,061,235	484,669,613	66.2
1922	----------	117,177,022	62,814,351	353,593,039	533,584,412	63.0
1923	----------	84,083,557	60,182,849	248,638,926	392,905,332	53.0
1924	----------	196,374,356	57,244,235	274,144,443	527,763,034	65.1
1925	----------	135,751,596	42,941,735	182,505,954	361,199,285	51.7
1926	----------	82,670,503	39,806,679	190,945,929	313,423,111	50.5
1927	----------	172,526,084	33,862,805	194,587,952	400,976,841	56.8
1928	----------	165,046,711	46,596,540	231,687,000	443,330,251	51.0
Average	----------	124,042,554	52,395,138	245,129,053	421,566,746	58.0

CANADIAN GRAIN

1920	179,156,820	971,271	----------	2,199,998	182,328,089	35.2
1921	245,748,887	1,827,617	----------	296,765	247,873,269	33.8
1922	309,222,655	2,735,382	----------	1,045,961	313,003,998	37.0
1923	338,452,312	3,492,593	----------	692,074	342,636,979	47.0
1924	280,016,341	3,029,429	----------	340,557	283,368,327	34.9
1925	333,783,439	3,287,809	----------	722,046	337,793,294	48.3
1926	304,436,530	2,457,954	----------	589,071	307,483,555	49.5
1927	302,612,944	1,468,580	----------	[1] 588,048	304,669,572	43.2
1928	422,153,202	1,486,154	----------	660,000	[1] 424,299,356	49.0
Average	301,731,459	2,306,310	----------	792,724	304,830,493	42.0

[1] All flaxseed.

SHIPMENTS OF GRAIN FROM UPPER LAKE PORTS

SHIPMENTS BY PORTS AND KINDS OF GRAIN

The following tables compiled from the elevator records of shipments, excluding local deliveries, give details of the shipments of grain at each port. They are of particular interest in showing the large volume of grain delivered from elevators which may be considered as potential water traffic. During the 9-year period Fort William-Port Arthur shipped 48.8 per cent of the grain from the four upper lake

ports; Chicago shipped 25.5 per cent; Duluth-Superior 18.1; and Milwaukee 6 per cent. Wheat constituted 55.6 per cent of the total grain shipped from the four ports; oats, 16.8 per cent; corn, 12.8 per cent; barley, 7 per cent; rye, 5.8 per cent; and flax about 2 per cent.

It has already been shown that the average receipts of grain at Fort William-Port Arthur and at Duluth-Superior during this period amounted to 301,731,459 and 126,348,864 bushels, respectively. Comparing these amounts with the shipments of 295,167,431 and 119,425,916 bushels, it becomes evident that these ports serve principally as concentration points for the grain moving to seaboard. At Chicago and Milwaukee large quantities of grain are consumed locally. This is apparent from a comparison of the average receipts of 245,921,773 bushels at Chicago and 52,395,138 bushels at Milwaukee with the average shipments of 154,249,899 and 35,701,093, respectively. Grain is shipped from upper lake ports by both water and rail routes.

TABLE NO. 63.—*Grain shipments at Port Arthur-Fort William, 1920–1928, by kinds of grain*[1]

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	128,035,794	22,619,312	236,556	8,338,076	2,294,249	2,164,010	163,687,997
1921	169,047,840	50,920,079	738,168	13,057,750	3,344,267	4,482,577	241,590,681
1922	245,734,190	36,282,499	153,495	14,953,709	9,933,414	3,179,390	310,236,697
1923	259,571,993	33,817,866	56,473	16,168,758	7,845,423	3,701,976	321,162,489
1924	204,968,375	45,703,757	----------	24,814,368	6,693,587	4,208,917	286,389,004
1925	237,002,018	42,029,080	----------	32,228,142	4,319,856	6,826,999	322,406,095
1926	238,346,889	25,113,887	----------	35,699,041	6,923,554	3,822,609	309,905,980
1927	246,460,986	10,401,290	----------	29,184,560	10,341,728	3,807,909	300,196,473
1928	319,376,117	27,398,950	----------	39,747,848	9,986,745	4,421,800	400,931,460
Average	227,616,022	32,698,525	131,633	23,799,139	6,853,647	4,068,465	295,167,431

[1] Does not include mixed grain, of which the following shipments were made: 642,521 bushels in 1923, 384,125 in 1924, 701,756 in 1925, 595,837 in 1926, 395,638 in 1927, 633,920 in 1928.

TABLE NO. 64.—*Grain shipments at Duluth-Superior, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	41,055,480	882,442	----------	3,345,550	23,511,074	3,333,255	72,127,801
1921	51,068,396	3,548,288	5,156,436	4,973,450	13,138,700	5,410,097	83,295,367
1922	51,421,450	8,338,249	13,731,491	4,390,291	37,101,339	3,475,933	118,458,803
1923	42,624,983	2,409,423	1,516,486	4,390,532	17,305,296	6,592,424	74,839,144
1924	93,258,434	11,297,661	8,171,460	12,675,642	43,414,115	14,602,314	183,419,626
1925	73,646,826	25,601,448	701,386	16,204,502	11,312,546	8,923,452	136,390,160
1926	48,888,069	10,621,890	----------	6,040,747	9,154,232	5,955,495	80,660,433
1927	100,507,457	7,989,911	18,016	23,529,966	31,633,589	10,100,931	173,779,870
1928	98,206,756	2,987,560	499,367	30,218,330	12,895,307	7,054,718	151,862,038
Average	66,741,983	8,168,319	3,310,516	11,752,112	22,162,917	7,272,069	119,425,916

TABLE NO. 65.—*Grain shipments at Milwaukee, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	3,736,369	15,964,042	7,434,094	2,612,403	4,007,156	11,487	33,765,551
1921	8,161,030	13,405,901	25,255,508	2,690,109	2,099,058	79,461	51,691,067
1922	2,500,136	18,389,629	20,728,584	3,965,929	2,491,742	278,816	48,354,836
1923	2,710,355	21,089,002	13,304,736	2,947,061	2,146,201	463,238	42,660,593
1924	8,490,416	13,843,623	10,013,453	3,941,473	2,269,825	15,894	38,574,684
1925	2,760,675	11,692,968	5,138,084	2,857,434	1,291,302	2,860	23,743,323
1926	7,400,354	7,087,926	4,319,954	1,870,355	661,306	7,150	21,347,045
1927	6,548,080	11,825,282	8,140,486	2,876,444	1,421,726	----------	30,812,018
1928	4,219,716	8,450,380	11,687,841	5,396,021	590,380	16,381	30,360,719
Average	5,169,681	13,527,639	11,780,304	3,239,692	1,886,522	97,254	35,701,093

TABLE NO. 66.—*Grain shipments at Chicago, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	36,064,000	46,421,000	37,778,000	4,592,000	7,439,000	144,000	132,438,000
1921	41,073,000	58,927,000	117,313,000	4,297,000	3,857,000	36,000	225,503,000
1922	50,385,000	73,732,000	119,451,000	3,312,000	5,390,000	8,000	252,278,000
1923	30,147,000	57,045,000	62,690,000	3,810,000	3,568,000	209,000	157,469,000
1924	63,435,000	46,012,000	45,921,000	4,652,000	7,121,000	32,000	167,173,000
1925	25,885,000	48,919,000	41,239,000	2,730,000	6,052,000	45,000	124,870,000
1926	32,131,000	36,678,000	39,232,000	2,453,000	2,292,000	43,000	112,829,000
1927	29,365,000	26,323,000	40,032,000	2,778,000	1,894,000	19,000	100,411,000
1928	19,660,000	34,004,000	53,898,000	6,291,000	1,407,000	18,000	115,278,000
Average	36,461,000	47,562,000	61,950,000	3,879,000	4,336,000	62,656	154,250,000

TABLE NO. 67.—*Grain shipments at upper lake ports, 1920–1928, inclusive, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Flaxseed	Total
1920	208,891,643	85,886,796	45,448,650	18,888,029	37,251,479	5,652,752	402,019,349
1921	269,350,266	126,801,268	148,463,112	25,018,309	22,439,025	10,008,135	602,080,115
1922	350,040,776	136,742,377	154,064,570	26,621,929	54,916,545	6,942,139	729,328,336
1923	335,054,331	114,361,291	77,567,695	27,316,251	30,864,920	10,966,638	596,131,226
1924	370,152,225	116,857,041	64,105,913	46,083,483	59,498,527	18,859,125	675,556,314
1925	339,294,519	128,242,496	47,078,470	54,020,078	22,975,704	15,798,311	607,409,578
1926	326,766,312	79,501,703	43,551,954	46,063,143	19,031,092	9,828,254	524,742,458
1927	382,881,523	56,539,483	48,190,502	58,368,970	45,291,043	13,927,840	605,199,361
1928	441,462,589	72,840,890	66,085,208	81,653,199	24,879,432	11,510,899	698,432,217
Average	335,988,243	101,974,816	77,172,897	42,670,387	35,238,641	11,499,344	604,544,328

SHIPMENTS BY WATER AND RAIL

Table No. 68 shows that out of the annual average of 604,544,328 bushels of grain shipped from the four upper lake ports during the 9-year period, 458,721,692 bushels, or 75.9 per cent, moved by water and 145,822,636 bushels, or 24.1 per cent, moved by rail. The last five years of the period have witnessed a decided increase in the proportion of grain utilizing the water route.

During the season of navigation the ports of Fort William-Port Arthur and Duluth-Superior utilize the lake route almost exclusively for shipping grain to the Atlantic seaboard. At Milwaukee and Chicago the greater part of the grain is shipped by rail, Chicago in particular having a large volume of shipments by rail throughout the year. Much of the grain shipped by rail to seaboard may be regarded as potential water traffic.

TABLE NO. 68.—*Grain shipments at upper lake ports, 1920–1928, by water and rail*

[Quantities in bushels]

BY WATER

Year	Fort William-Port Arthur[1]	Duluth-Superior	Milwaukee	Chicago	Total	Per cent
1920	138, 447, 301	60, 686, 819	3, 145, 887	24, 306, 750	226, 586, 757	56. 4
1921	219, 477, 630	74, 916, 491	29, 067, 195	127, 034. 011	450, 495, 327	74. 8
1922	278, 738, 356	113, 691, 974	14, 151, 886	96, 917, 874	503, 500, 090	69. 0
1923	303, 331, 171	69, 044, 509	7, 024, 753	34, 861, 618	414, 262, 051	69. 5
1924	273, 674. 242	175, 314, 950	14, 314, 796	74, 030, 000	537, 333, 988	79. 6
1925	311, 015, 799	129, 510, 042	7, 955, 689	41, 885, 000	490, 366, 530	80. 7
1926	294, 521, 200	72, 557, 821	9, 345, 894	50, 030, 000	426, 454, 915	81. 3
1927	279, 558, 384	165, 246, 622	16, 515, 893	46, 629, 000	507, 949, 899	83. 9
1928	386, 799, 674	145, 223, 980	10, 487, 018	29, 030, 000	571, 545, 672	81. 8
Average	276, 173, 751	111, 799, 801	12, 445, 446	58, 302, 695	458, 721, 692	75. 9

BY RAIL

1920	25, 240, 696	11, 440, 982	30, 619, 664	108, 131, 250	175, 432, 592	43. 6
1921	22, 113, 051	8, 378, 876	22, 623, 872	98, 468, 989	151, 584, 788	25. 2
1922	31, 498, 341	4, 766, 829	34, 202, 950	155, 360, 126	225, 828, 246	30. 0
1923	17, 831, 318	5, 794, 635	35, 635, 840	122, 607, 382	181, 869, 175	30. 5
1924	12, 714, 762	8, 104, 676	24, 259, 888	93, 143, 000	138, 222, 326	20. 4
1925	11, 390, 296	6, 880, 118	15, 787, 634	82, 985, 000	117, 043, 048	19. 3
1926	15, 384, 780	8, 102, 612	12, 001, 151	62, 799, 000	98, 287, 543	18. 7
1927	20, 638, 089	8, 533, 248	14, 296, 125	53, 782, 000	97, 249, 462	16. 1
1928	14, 131, 786	6, 633, 058	19, 873, 701	86, 248, 000	126, 886, 545	18. 2
Average	18, 993, 680	7, 626, 115	23, 255, 647	95, 947, 194	145, 822, 636	24. 1

[1] Does not include mixed grain.

The trend of water shipments from upper lake ports is well indicated by Table No. 69, showing shipments by water from 1868 to 1928, inclusive. These figures show that the gradual increase in the total quantity of grain moving by water is due to the steady increase in the shipments from Lake Superior. While the volume of grain moving on the Great Lakes in 1928 is over eleven and one-half times as great as the volume moving in 1868, it is clearly evident that there has been no corresponding increase in the amount shipped by water from Lake Michigan. Rail carriers have been able to control in large measure the movement of grain which has reached the important primary market of Chicago.

TABLE No. 69.—*Shipments of grain by water from upper lake ports, 1868–1928*

[In thousands of bushels]

Year	Port Arthur-Fort William	Duluth-Superior	Milwaukee	Chicago	Total
1928	386,800	145,229	10,487	29,030	571,546
1927	279,558	165,247	16,516	46,629	507,950
1926	294,521	72,558	9,346	50,030	426,455
1925	311,016	129,510	7,956	41,885	490,367
1924	273,674	175,315	14,315	74,030	537,334
1923	303,331	69,044	7,025	34,862	414,262
1922	278,738	113,692	14,152	96,918	503,500
1921	219,478	74,916	29,067	127,034	450,495
1920	138,447	60,687	3,146	24,307	226,587
1919	122,824	43,645	6,795	45,526	218,790
1918	79,301	74,217	18,731	74,334	246,583
1917	205,799	47,516	2,473	10,564	266,352
1916	254,923	64,329	3,447	25,058	347,757
1915	201,134	119,134	13,191	44,438	377,897
1914	125,369	93,253	18,712	89,791	327,125
1913	201,171	115,880	6,031	55,180	378,262
1912	132,921	110,190	7,929	47,608	298,648
1911	221,310	42,119	12,849	73,322	349,600
1910	78,832	46,673	13,031	57,160	195,696
1909	80,600	78,973	9,017	41,065	209,655
1908	67,941	81,559	6,829	38,840	195,169
1907	64,004	77,595	6,276	66,212	214,087
1906	54,780	83,834	6,411	60,937	205,962
1905	46,728	60,822	4,259	68,423	180,232
1904	36,188	46,771	6,612	56,387	145,958
1903	41,065	52,415	7,349	103,902	204,731
1902	41,939	62,532	5,033	65,275	174,779
1901	17,826	59,747	8,369	81,123	167,065
1900	12,927	43,736	12,198	130,825	199,686
1899	46,961	41,437	24,496	88,180	201,074
1898	13,828	74,590	18,324	158,264	262,006
1897	24,036	56,777	8,820	161,625	251,258
1896	7,100	83,604	11,568	117,834	220,106
1895	9,892	44,654	8,845	84,170	147,561
1894	7,712	28,702	4,966	68,977	110,357
1893	10,772	35,114	5,500	106,907	158,293
1892	7,347	35,314	4,443	98,916	146,020
1891	4,039	35,809	1,944	96,272	138,064
1890	918	17,343	2,029	85,633	105,923
1889	3,325	15,240	1,236	100,660	120,461
1888	6,628	13,990	1,914	67,894	90,426
1887	3,904	19,967	4,395	66,514	94,780
1886	1,677	18,029	4,359	55,086	79,151
1885	1,408	14,289	3,380	36,707	55,784
1884	951	11,551	2,228	46,894	61,624
1883	----------	6,677	4,870	62,600	74,147
1882	----------	4,202	1,373	50,782	56,357
1881	----------	3,825	5,630	56,662	66,117
1880	----------	4,659	9,100	91,777	105,536
1879	----------	3,578	11,168	62,140	76,886
1878	----------	2,138	11,694	67,888	81,720
1877	----------	5,610	16,810	57,055	79,475
1876	----------	2,396	13,585	40,078	56,059
1875	----------	1,486	20,363	42,692	64,541
1874	----------	4,712	18,972	52,361	76,045
1873	----------	2,430	23,840	57,461	83,731
1872	----------	1,013	13,289	58,856	73,158
1871	----------	1,685	14,188	57,564	73,437
1870	----------	354	15,935	35,461	51,750
1869	----------	323	14,301	43,322	57,946
1868	----------	285	10,183	38,117	48,585

SHIPMENTS BY NATIONALITY OF GRAIN

Table No. 70 discloses the fact that shipments of United States grain have not kept pace with the Canadian shipments. Out of an average movement of 604,544,328 bushels from the four upper lake ports during the period under consideration 307,399,175 bushels or 50.8 per cent originated in the United States and 297,145,153 bushels or 49.2 per cent originated in Canada. Considering only the first four years of the period, an average of 62.3 per cent of the shipments

consisted of United States grain and 37.7 per cent of Canadian. Duluth-Superior was the only United States port shipping any Canadian grain, as well as the only one of the four ports shipping both United States and Canadian grain.

TABLE No. 70.—*Grain shipments at upper lake ports, 1920–1928, by nationality of grain*

[Quantities in bushels]

UNITED STATES GRAIN

Year	Fort William-Port Arthur	Duluth-Superior	Milwaukee	Chicago	Total	Per cent
1920	----------	71,334,076	33,765,551	132,438,000	237,537,627	59.0
1921	----------	81,785,769	51,691,067	225,503,000	358,979,836	59.6
1922	----------	116,204,683	48,354,836	252,278,000	416,837,519	57.1
1923	----------	72,808,064	42,660,593	157,469,000	272,937,657	45.8
1924	----------	180,890,074	38,574,684	167,173,000	386,637,758	57.2
1925	----------	133,164,537	23,743,323	124,870,000	281,777,860	46.4
1926	----------	78,055,535	21,347,045	112,829,000	212,231,580	40.5
1927	----------	172,352,699	30,812,018	100,411,000	303,575,717	50.1
1928	----------	150,438,305	30,360,719	115,278,000	296,077,024	42.4
Average	----------	117,448,193	35,701,093	154,249,889	307,399,175	50.8

CANADIAN GRAIN

1920	163,687,997	793,725	----------	----------	164,481,722	41.0
1921	241,590,681	1,509,598	----------	----------	243,100,279	40.4
1922	310,236,697	2,254,120	----------	----------	312,490,817	42.9
1923	321,162,489	2,031,080	----------	----------	323,193,569	54.2
1924	286,389,004	2,529,552	----------	----------	288,918,556	42.8
1925	322,406,095	3,225,623	----------	----------	325,631,718	53.6
1926	309,905,980	2,604,898	----------	----------	312,510,878	59.5
1927	300,196,473	1,427,171	----------	----------	301,623,644	49.9
1928	400,931,460	1,423,733	----------	----------	402,355,193	57.6
Average	295,167,431	1,977,722	----------	----------	297,145,153	49.2

DESTINATION OF LAKE SHIPMENTS

Tables Nos. 71 to 76, inclusive, show the destination of each kind of grain moving by water from upper lake ports during the calendar year 1928, and Table No. 77 gives a consolidation for all grains. These tables have been prepared from records at the ports of shipment and they are not to be considered as indicating that the amounts of grain shown actually moved down the Lakes during that year. The situation on the Lakes is such that the records of shipping and receiving ports for any one year do not and should not agree. A large amount of grain recorded as shipped from Fort William-Port Arthur, for instance, may remain in vessels at the head of the Lakes and not be received at destination until the following year. Cargoes originally consigned to certain lower lake ports are often diverted on arrival at the Soo, and there are both shortages and overages in the turnouts at lower lake ports.

The tables show the destination of 571,627,750 bushels of grain, not including 654,825 bushels shipped direct from Fort William-Port Arthur to Europe.

Wheat.—A total of 412,937,531 bushels of wheat were shipped from the four upper lake ports to American and Canadian ports, and an

additional 654,825 bushels consigned direct to Europe from Fort William-Port Arthur, making a grand total of 413,592,356 bushels. Shipments to American ports constituted 57.8 per cent of this total and shipments to Canadian ports 42.2 per cent. Buffalo was the largest receiving port for wheat, with a total of 209,701,893 bushels, of which 151,240,228 bushels came from Fort William-Port Arthur. Since all of the shipments from Chicago and Milwaukee were consigned to Buffalo, it was the only port receiving wheat from all four of the upper lake ports. Port Colborne took second place as a receiving port for wheat from the upper lake ports, with 72,084,247 bushels. All of the important Georgian Bay ports received substantial shipments of wheat from Fort William-Port Arthur and Duluth-Superior.

TABLE NO. 71.—*Destination of lake shipments of wheat from upper lake ports, 1928*

[Quantities in bushels]

Ports of destination	From—				Total
	Fort William-Port Arthur	Duluth-Superior	Milwaukee	Chicago	
Buffalo	151,240,228	50,073,084	3,591,581	4,797,000	209,701,893
Chicago		3,652,764			3,652,764
Cleveland		451,000			451,000
Detroit		306,479			306,479
Erie	6,789,603				6,789,603
Fairport	10,064,305	861,180			10,925,485
Toledo	3,793,447	3,192,819			6,986,266
Total United States ports	171,887,583	58,537,326	3,591,581	4,797,000	238,813,490
Depot Harbor	7,093,513	287,599			7,381,112
Goderich	11,618,039	2,139,640			13,757,679
Midland	21,386,169	3,319,675			24,705,844
Montreal	7,547,579	1,587,887			9,135,466
Owen Sound	2,856,144	1,612,150			4,468,294
Port Colborne	58,231,116	13,853,131			72,084,247
Port McNicoll	13,748,654	7,150,324			20,898,978
Port Stanley	60,000				60,000
Quebec	488,442				488,442
Sarnia	6,790,643	1,782,384			8,573,027
Tiffin	9,004,266	3,346,917			12,351,183
Toronto	219,769				219,769
Total Canadian ports	139,044,334	35,079,707			174,124,041
Grand total	[1] 310,931,917	93,617,033	3,591,581	4,797,000	[1] 412,937,531

[1] 654,825 additional to Europe direct.

Oats.—A somewhat different situation is shown with respect to the distribution of oats from upper lake ports, the Canadian ports receiving more than three times as much as the American ports. Shipments of oats were forwarded from Green Bay, Wis., as well as from the four principal upper lake ports. Out of a grand total of 36,682,357 bushels of oats originating at upper lake ports, Port Colborne received 12,020,186 bushels, most of which originated at Fort William-Port Arthur. Buffalo, which was the only port receiving oats from all five of the shipping ports, ranked second with 6,410,007 bushels.

TABLE NO. 72.—*Destination of lake shipments of oats from upper lake ports, 1928*

[Quantities in bushels]

Ports of destination	From—					Total
	Fort William-Port Arthur	Duluth-Superior	Green Bay	Milwaukee	Chicago	
Buffalo	747, 228	1, 316, 458	864, 119	1, 662, 202	1, 820, 000	6, 410, 007
Fairport		678, 275				678, 275
Ogdensburg			125, 160	638, 732		763, 892
Toledo		656, 199				656, 199
Total United States ports	747, 228	2, 650, 932	989, 279	2, 300, 934	1, 820, 000	8, 508, 373
Collingwood					656, 000	656, 000
Depot Harbor			95, 960	598, 298	1, 874, 000	2, 568, 258
Goderich	1, 944, 522		95, 000			2, 039, 522
Midland	2, 394, 271				296, 000	2, 690, 271
Montreal	3, 819, 099			252, 148	240, 000	4, 311, 247
Owen Sound	2, 146, 812	90, 000				2, 236, 812
Port Colborne	10, 766, 196				1, 254, 000	12, 020, 196
Port McNicoll		181, 654				181, 654
Quebec	653, 707					653, 707
Sarnia	41, 749					41, 749
Tiffin	167, 983				463, 000	630, 983
Toronto	143, 585					143, 585
Total Canadian ports	22, 077, 924	271, 654	190, 960	850, 446	4, 783, 000	28, 173, 984
Grand total	22, 825, 152	2, 922, 586	1, 180, 239	3, 151, 380	6, 603, 000	36, 682, 357

Corn.—During the calendar year 1928 shipments of corn were forwarded by water from Green Bay and Manitowoc, as well as from the three principal United States upper lake ports. No corn was shipped by the Canadian port Fort William-Port Arthur via the lake route during 1928. Buffalo received over half of the total amount of corn from upper lake ports, the remainder going to Canadian ports. Tiffin and Depot Harbor each received large shipments from Chicago.

TABLE NO. 73.—*Destination of lake shipments of corn from upper lake ports, 1928*

[Quantities in bushels]

Ports of destination	From—					Total
	Duluth-Superior	Green-Bay	Manitowoc	Milwaukee	Chicago	
Buffalo	373, 164	136, 538	753, 700	2, 229, 470	6, 800, 000	10, 292. 872
Total United States ports	373, 164	136, 538	753, 700	2, 229, 470	6, 800, 000	10, 292, 872
Cardinal					841, 000	841, 000
Collingwood					662, 000	662, 000
Depot Harbor	114, 000			242, 486	1, 130, 000	1, 486, 486
Goderich		50, 000		189, 000		239, 000
Midland					981, 000	981, 000
Montreal					501, 000	501, 000
Owen Sound					601, 000	601, 000
Port McNicoll			158, 128			158, 128
Quebec					204, 000	204, 000
Sarnia					326, 000	326, 000
Tiffin		81, 956	114, 572		2, 737, 000	2, 933, 528
Walkerville					301, 000	301, 000
Total Canadian ports	114, 000	131, 956	272, 700	431, 486	8, 284, 000	9, 234, 142
Grand total	487, 164	268, 494	1, 026, 400	2, 660, 956	15, 084, 000	19, 527, 014

Barley.—Barley was shipped by water from each of the upper lake ports during the calendar year 1928. Of the total shipments from these ports 52 per cent came from Fort William-Port Arthur and 43 per cent from Duluth-Superior. About half of the shipments were consigned to Buffalo and about one-fourth to Port Colborne.

TABLE NO. 74.—*Destination of lake shipments of barley from upper lake ports, 1928*

[Quantities in bushels]

Ports of destination	From—				Total
	Fort William-Port Arthur	Duluth-Superior	Milwaukee	Chicago	
Buffalo	23,049,580	11,033,645	504,301	135,000	34,722,526
Erie	1,341,789				1,341,789
Fairport	231,711				231,711
Total United States ports	24,623,080	11,033,645	504,301	135,000	36,296,026
Depot Harbor	458,406		97,450	80,000	635,856
Goderich	707,088	393,000			1,100,088
Midland	1,551,512	730,597		104,000	2,386,109
Montreal	1,576,744	1,201,964	256,875	241,000	3,276,583
Owen Sound	349,674	1,096,559			1,446,233
Port Colborne	4,111,209	11,152,869	224,475	1,221,000	16,709,553
Port McNicoll	1,059,967	2,866,274			3,926,241
Sarnia		144,500			144,500
Tiffin	1,845,952	1,045,300			2,891,252
Total Canadian ports	11,660,552	18,631,063	578,800	1,646,000	32,516,415
Grand total	36,283,632	29,664,708	1,083,101	1,781,000	68,812,441

Rye.—Shipments of rye during the calendar year 1928 came from Fort William-Port Arthur, Duluth-Superior, and Chicago, with Duluth-Superior ranking first as a shipping port. Most of the rye shipments were consigned to Canadian ports, although Buffalo received more than any other port. Other rye-receiving ports in the order of their importance were Port Colborne, Midland, Chicago, and Tiffin. It is interesting to note that Chicago received 1,307,178 bushels of rye from Duluth-Superior and shipped 765,000 bushels to Buffalo and Port Colborne.

TABLE NO. 75.—*Destination of lake shipments of rye from upper lake ports, 1928*

[Quantities in bushels]

Ports of destination	From—			Total
	Fort William-Port Arthur	Duluth-Superior	Chicago	
Buffalo	3,800,016	3,833,508	485,000	8,118,524
Chicago	----------	1,307,178	----------	1,307,178
Fairport	693,772	191,818	----------	885,590
Total United States ports	4,493,788	5,332,504	485,000	10,311,292
Depot Harbor	152,965	376,320	----------	529,285
Goderich	62,000	363,560	----------	425,560
Midland	1,199,177	1,181,124	----------	2,380,301
Montreal	504,450	104,600	----------	609,050
Owen Sound	----------	742,634	----------	742,634
Port Colborne	2,497,937	3,157,766	280,000	5,935,703
Port McNicoll	168,215	586,550	----------	754,765
Tiffin	464,401	745,696	----------	1,210,097
Sarnia	479,602	27,645	----------	507,247
Walkerville	93,554	----------	----------	93,554
Total Canadian ports	5,622,361	7,285,895	280,000	13,188,196
Grand total	10,116,089	12,618,399	765,000	23,499,488

Flaxseed.—Shipments of flaxseed during the calendar year 1928 came from the Lake Superior region only. Lower lake receiving ports in the order of their importance were Buffalo, Cleveland, Toledo, Port Colborne, and Chicago, with smaller amounts going to several other ports.

TABLE NO. 76.—*Destination of lake shipments of flaxseed from upper lake ports, 1928*

[Quantities in bushels]

Ports of destination	From—		Total
	Fort William-Port Arthur	Duluth-Superior	
Buffalo	1,200,342	4,320,082	5,520,424
Chicago	660,847	----------	660,847
Cleveland	961,298	456,914	1,418,212
Milwaukee	102,803	----------	102,803
Toledo	----------	1,142,094	1,142,094
Total United States ports	2,925,290	5,919,090	8,844,380
Goderich	266,873	----------	266,873
Midland	40,000	----------	40,000
Montreal	82,508	----------	82,508
Owen Sound	72,700	----------	72,700
Port Colborne	804,624	----------	804,624
Port McNicoll	57,834	----------	57,834
Total Canadian ports	1,324,539	----------	1,324,539
Grand total	4,249,829	5,919,090	10,168,919

All grains.—Table No. 77 gives a consolidated view of the distribution of lake shipments of grain from upper lake ports during the calendar year 1928. A total of 571,627,750 bushels of grain, originating at the four principal upper lake ports and at Manitowoc and Green

Bay, was shipped to American and Canadian ports, to which must be added the 654,825 bushels of wheat consigned direct to Europe from Fort William-Port Arthur. This makes a grand total of 572,282,575 bushels of grain originating at upper lake ports and utilizing lake transportation.

TABLE NO. 77.—*Destination of lake shipments of grain from upper lake ports, 1928*

[Quantities in bushels]

Port of destinations	From—						Total
	Fort William-Port Arthur[1]	Duluth-Superior	Green Bay	Manitowoc	Milwaukee	Chicago	
Buffalo	180,037,394	70,949,941	1,000,657	753,700	7,987,554	14,037,000	274,766,246
Chicago	660,847	4,959,942					5,620,789
Cleveland	961,298	907,914					1,869,212
Detroit		306,479					306,479
Erie	8,131,392						8,131,392
Fairport	10,989,788	1,731,273					12,721,061
Ogdensburg			125,160		638,732		763,892
Toledo	3,793,447	4,991,112					8,784,559
Milwaukee	102,803						102,803
Total United States ports	204,676,969	83,846,661	1,125,817	753,700	8,626,286	14,037,000	313,066,433
Cardinal						841,000	841,000
Collingwood						1,318,000	1,318,000
Depot Harbor	7,704,884	777,919	95,960		938,234	3,084,000	12,600,997
Goderich	14,598,522	2,896,200	145,000		189,000		17,828,722
Midland	26,571,129	5,231,396				1,381,000	33,183,525
Montreal	13,530,380	2,894,451			509,023	982,000	17,915,854
Owen Sound	5,425,330	3,541,343				601,000	9,567,673
Port Colborne	76,411,082	28,163,766			224,475	2,755,000	107,554,323
Port McNichol	15,034,670	10,784,802		158,128			25,977,600
Port Stanley	60,000						60,000
Quebec	1,142,149					204,000	1,346,149
Sarnia	7,311,994	1,954,529				326,000	9,592,523
Tiffin	11,482,602	5,137,913	81,956	114,572		3,200,000	20,017,043
Toronto	363,354						363,354
Walkerville	93,554					301,000	394,554
Total Canadian ports	179,729,650	61,382,319	322,916	272,700	1,860,732	14,993,000	258,561,317
Grand total	[2]384,406,619	145,228,980	1,448,733	1,026,400	10,487,018	29,030,000	[2]571,627,750

[1] During season of navigation May 4 to Dec. 12, 1928.
[2] 654,825 additional to Europe direct.

RECEIPTS OF GRAIN AT LOWER LAKE PORTS[1]

ORIGIN OF GRAIN RECEIVED AT LOWER LAKE PORTS

The destination of grain shipped by water from upper lake ports during the calendar year 1928 has already been shown in Tables Nos. 71 to 77, inclusive, and it has been explained that there are quite properly considerable differences in the records of upper lake and lower lake ports respecting grain shipped from the former and received at the latter during any one year. The figures presented in the tables mentioned above were derived from the elevator records at upper lake ports. Somewhat different results would be shown by tables prepared from the records of lower lake ports, caused by the

[1] Not including Lake Ontario and St. Lawrence River ports.

detention of loaded vessels at the head of the Lakes after the closing of navigation or by diversions at the Soo. It is believed, however, that the differences involved are not sufficient to make it necessary to present such tables.

In addition to the grain moving down the Great Lakes to lower lake ports, these ports receive grain by rail. Since the purpose of this chapter is to trace the movement of grain on the Lakes, and since only fragmentary data are available concerning the origin of grain received by rail at lower lake ports, the information presented on this subject has been confined to a statement of the total receipts by rail at each port. This information is contained in Table No. 86, appearing on page 131.

RECEIPTS BY PORTS AND KINDS OF GRAIN

Grain shipped by water from upper lake ports moves to the various ports on Georgian Bay, Lake Huron, the Detroit River, and Lake Erie, with smaller amounts direct to Lake Ontario and St. Lawrence River points and an occasional shipment consigned direct to Europe. The elevators at the various lower lake ports perform vastly different functions. Those at Georgian Bay and Lake Huron receive grain almost entirely by water and ship almost entirely by rail. These Georgian Bay ports operate mainly as transfer elevators during the navigation season, but toward the close of the season they are usually filled to capacity and serve as distributors for grain moving during the winter to both foreign and domestic points. Detroit, Toledo, and Cleveland receive and ship the greater part of their grain by rail, while at Fairport and Erie most of the grain enters by the lake route and moves out by rail. Shipments from Fairport are forwarded by way of the Baltimore & Ohio Railroad, while those from Erie move over the Pennsylvania system.

Buffalo, the most important of all the lower lake ports, receives a large amount of grain from Chicago and other western points. While the greater proportion of this grain comes by water, large shipments are received by rail throughout the year. Data concerning the amounts received by rail are available only for the years 1924 to 1927, inclusive, and the figures for the other years represent water receipts only. Buffalo flour mills consume a large amount of wheat, but the major portion of the grain arriving at this port is transshipped either to rail or water carriers for movement beyond.

Port Colborne is the principal point for the transfer of grain from large lake carriers to the smaller type vessels suitable for use on the St. Lawrence River. This is the usual route for grain moving by water to Montreal. The statistics presented in Table No. 86 indicate that out of an average of 78,284,615 bushels received per annum, only 344,888 bushels or less than one-half of 1 per cent was received by rail.

Wheat.—Table No. 78 shows receipts of wheat by both water and rail at lower lake ports during the 9-year period 1920–1928. This table indicates that the 16 lower lake ports listed received an annual average of 299,494,938 bushels of wheat. This average would be considerably increased were data on rail receipts at Buffalo available for each year of the period, but disregarding the missing data, Buffalo received an average of 157,503,379 bushels or 52.2 per cent of the total receipts at the 16 ports. Port Colborne was second in importance during the 9-year period, with an average of 54,617,730 bushels or approximately 18 per cent of the total. Port McNicoll ranked third with 24,319,190 bushels and Tiffin fourth with 13,642,315 bushels. The total receipts at all ports were less in 1920 than in any other year of the period, and, due to the fact that Canada produced a bumper wheat crop in 1928, all previous records for receipts at lower lake ports were outstripped with a total of 394,626,975 bushels in that year.

TABLE NO. 78.—*Wheat receipts at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor	1,218,429	251,739	1,899,531	2,700,383	3,943,299
Port McNicoll	24,193,903	32,366,743	27,953,551	27,006,620	21,677,168
Tiffin	15,247,627	12,073,398	13,766,265	20,142,209	12,558,778
Midland	8,683,796	5,484,977	10,555,389	12,933,668	7,686,457
Collingwood	[1]	53,466	199,752	152,156	49,060
Owen Sound					
Goderich	7,078,663	8,989,417	13,988,633	12,719,125	12,450,772
Sarnia					
Port Huron	[1]	704,474	3,513,193	869,126	457,357
Detroit	1,970,686	1,916,599	2,091,508	1,581,581	1,776,000
Toledo	5,034,375	7,189,175	9,679,570	14,980,454	13,311,000
Cleveland	2,122,671	2,007,785	1,425,687	1,265,083	1,418,574
Fairport	109,930	214,934	3,599,138	2,082,483	1,230,208
Erie	2,510,498	1,021,378	9,838,190	7,342,196	8,773,656
Port Colborne	15,624,641	30,383,464	48,670,827	61,683,157	78,264,116
Buffalo	[2] 75,999,344	[2] 133,308,600	[2] 161,799,923	[2] 132,617,679	182,304,913
Total	159,794,563	235,966,149	308,981,157	298,075,920	345,901,358

Port	1925	1926	1927	1928	Average (1920–1928)
Depot Harbor	508,387	215,827	999,491	7,330,667	2,118,639
Port McNicoll	21,079,656	27,655,232	17,019,841	19,920,000	24,319,190
Tiffin	14,357,523	13,186,305	9,183,147	12,265,581	13,642,315
Midland	9,984,109	7,268,677	11,421,015	20,465,441	10,498,170
Collingwood					50,493
Owen Sound	62,297	1,925,109	4,448,749	5,178,750	1,290,544
Goderich	11,692,861	13,405,788	12,673,564	13,268,276	11,807,452
Sarnia			894,818	4,253,972	572,088
Port Huron [3]					616,017
Detroit	1,014,000	1,876,000	2,450,000	2,040,000	1,857,375
Toledo	9,262,000	12,115,000	16,878,000	12,250,000	11,188,842
Cleveland	1,144,110	1,025,818	1,340,465	1,065,699	1,423,988
Fairport	3,912,117	7,345,404	3,806,231	6,656,728	3,217,464
Erie	4,057,568	897,922	3,030,661	5,469,173	4,771,249
Port Colborne	46,772,930	60,685,162	75,603,900	73,871,373	54,617,730
Buffalo	176,843,636	155,613,678	188,451,324	[3] 210,591,315	157,503,379
Total	300,691,188	303,215,922	348,201,206	394,626,975	299,494,938

[1] Figures not available.
[2] By water only.
[3] Elevator burned. No grain since 1924. 1924 figure represents water receipts only.

Oats.—The annual receipts of oats at the 16 lower lake ports have fluctuated from the low of 25,620,393 bushels in 1920 to the high of 84,852,144 bushels in 1925, decreasing since that time until less than half that amount was received annually in 1927 and 1928. Buffalo and Port Colborne together receive about half of the total amount reaching lower lake ports, with Toledo ranking third. The average annual receipts of oats at Canadian lower lake ports amounted to 24,676,343 bushels and at United States ports to 28,645,810 bushels.

TABLE NO. 79.—*Oats receipts at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor	754,029	3,543,173	529,578	857,553	4,723,957
Port McNicoll	2,654,384	12,633,307	4,518,725	4,341,087	3,054,104
Tiffin	2,865,122	4,494,870	1,906,691	2,941,944	4,677,420
Midland	1,090,918	7,701,225	3,700,914	2,958,182	3,999,160
Collingwood	[1]		52,946		
Owen Sound					
Goderich	2,579,164	7,183,931	3,291,944	4,257,412	6,145,529
Sarnia					
Port Huron [2]	[1]	1,512,349	284,479		892,409
Toledo	4,796,610	5,775,800	3,761,068	3,967,900	6,807,000
Detroit	713,165	679,645	820,329	1,550,150	1,957,000
Cleveland	4,193,062	4,173,618	3,196,202	2,517,681	2,105,980
Fairport					
Erie	348,314		749,724	1,709,515	
Port Colborne	30,007	7,410,482	6,212,465	6,361,547	5,418,543
Buffalo	[3] 5,595,618	[3] 22,274,974	[3] 26,226,019	[3] 10,447,247	27,389,891
Total	25,620,393	77,383,374	55,251,084	41,910,218	67,170,993

Port	1925	1926	1927	1928	Average (1920–1928)
Depot Harbor	6,375,087	2,567,056	1,516,520	2,630,071	2,610,780
Port McNicoll	1,927,613	652,202	1,422,949	276,500	3,497,876
Tiffin	3,761,057	3,343,508	1,537,482	836,731	2,929,425
Midland	2,350,755	2,306,114	934,473	2,712,636	3,083,820
Collingwood			85,220	529,778	74,216
Owen Sound	991,474	1,488,219	3,057,872	1,376,450	768,224
Goderich	3,745,032	2,693,865	1,226,825	1,484,151	3,623,095
Sarnia			54,516	41,776	10,699
Port Huron [2]					298,804
Toledo	9,263,000	6,949,000	8,336,000	5,105,000	6,084,598
Detroit	2,180,000	2,245,000	940,000	842,000	1,325,254
Cleveland	1,958,112	1,597,732	1,000,882	1,259,173	2,444,716
Fairport			809,957	138,270	105,358
Erie					311,950
Port Colborne	18,069,765	14,269,609	4,591,564	10,339,892	8,078,208
Buffalo	34,230,249	15,783,860	10,777,880	[3] 9,950,433	18,075,130
Total	84,852,144	53,896,165	36,292,140	37,522,861	53,322,153

[1] Figures not available.
[2] 1924 receipts by water only. Elevator burned. No grain since 1924.
[3] By water only.

Corn.—The receipts of corn at lower lake ports in the years 1921 and 1922 exceeded the receipts during the remaining seven years of the period. Buffalo far outranks the other ports in the receipt of corn, an average of 15,521,318 bushels having reached that port yearly. Depot Harbor ranks second with an average receipt of 3,909,035

bushels, followed in close succession by Tiffin, Port Colborne, and Toledo.

TABLE No. 80.—*Corn receipts at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor	1,999,428	10,785,802	9,966,861	2,167,258	1,811,978
Port McNicoll	254,613	6,512,298	8,180,673	213,163	384,914
Tiffin	680,320	11,192,645	5,380,607	1,472,492	1,307,071
Midland		465,005	1,198,727	103,755	
Collingwood	[1]	1,310,888	690,733	2,500,773	2,017,232
Owen Sound					
Goderich	112,475	2,575,988	1,412,251	631,481	439,840
Sarnia					
Port Huron	[1]	556,736	292,615	33,755	[2]
Detroit	318,349	265,058	399,809	686,387	367,000
Toledo	2,230,585	3,302,500	4,092,700	3,126,250	4,055,000
Cleveland	1,503,075	3,435,318	2,767,920	2,122,738	1,634,733
Fairport	1,570,135	2,253,836	737,344		
Erie		181,957	575,492	357,531	
Port Colborne		22,499,845	10,520,766	322,316	
Buffalo	[3] 4,008,644	[3] 39,614,661	[3] 32,035,644	[3] 9,401,935	15,793,173
Total	12,677,624	104,952,537	78,252,142	23,139,834	27,810,941

Port	1925	1926	1927	1928	Average (1920–1928)
Depot Harbor	1,647,109	2,617,120	3,334,248	851,512	3,909,035
Port McNicoll		261,813	899,883	158,128	1,873,943
Tiffin	1,643,985	4,603,678	5,258,672	3,580,164	3,902,182
Midland		413,086		567,244	305,313
Collingwood	2,228,383	225,567	514,010	594,507	1,120,233
Owen Sound		1,183,914	670,790	692,891	283,066
Goderich		164,335	62,855	162,275	617,944
Sarnia				325,716	36,191
Port Huron [2]					98,123
Detroit	472,000	624,000	750,000	864,000	527,400
Toledo	3,381,000	4,636,000	3,112,000	1,674,000	3,290,004
Cleveland	1,471,478	2,582,343	1,983,750	1,554,320	2,117,297
Fairport					506,813
Erie					123,887
Port Colborne	14,957	191,543			3,727,714
Buffalo	9,449,336	7,705,130	11,647,594	[3] 10,035,744	15,521,318
Total	20,308,248	25,208,529	28,233,802	21,060,501	37,960,462

[1] Figures not available.
[2] Elevator burned 1924. No receipts grain since.
[3] By water only.

Barley.—The effect of the record-breaking Canadian grain crop is again seen in the amount of barley reaching lower lake ports, making 1928 the outstanding year of the period for the receipt of this grain as well as wheat. Over four-fifths of the barley received at the 15 ports listed during this period was credited to the ports of Buffalo and Port Colborne; Port McNicoll, Tiffin, and Midland being the only other ports receiving in excess of 1,000,000 bushels per annum.

TABLE NO. 81.—*Barley receipts at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor					107,091
Port McNicoll	1,695,968	3,355,575	1,259,200	1,414,182	1,656,844
Tiffin	904,494	937,891	538,850	1,147,852	2,928,326
Midland	372,154	2,358,750	874,520	963,825	441,850
Collingwood	(1)		89,678		
Owen Sound					
Goderich	761,313	44,941	567,867	393,197	807,938
Sarnia					
Port Huron	(1)		141,700		215,044
Detroit	256,650	221,300	331,000	484,304	109,000
Toledo	44,600	41,400	28,800	58,800	40,000
Cleveland	73,951	67,984	89,100	112,223	59,765
Erie					
Port Colborne	943,268	1,651,756	3,118,438	3,928,142	1,977,681
Buffalo	[2] 4,431,432	[2] 7,974,215	[2] 9,826,610	[2] 8,513,903	[2] 26,109,166
Total	9,487,830	16,653,812	16,865,763	17,016,428	34,452,705

Port	1925	1926	1927	1928	Average (1920–1928)
Depot Harbor		222,538	846,007	595,177	196,757
Port McNicoll	2,557,095	898,649	913,005	2,729,144	1,831,518
Tiffin	2,239,872	810,025	883,866	2,723,739	1,457,213
Midland	486,510	1,154,222	536,628	2,530,520	1,079,887
Collingwood					9,964
Owen Sound	223,766	188,147	886,784	1,645,266	327,107
Goderich	701,072	1,027,564	567,916	638,988	612,311
Sarnia				143,522	39,638
Port Huron [3]					15,744
Detroit	203,000	187,000	96,000	216,000	233,806
Toledo	46,000	44,000	83,000	299,000	76,177
Cleveland	31,438		139	34,916	52,168
Erie		1,068,301	392,756		162,340
Port Colborne	7,880,405	12,570,605	11,406,621	16,189,913	6,629,648
Buffalo [2]	32,808,577	19,382,591	28,991,474	35,688,059	19,302,892
Total	47,177,735	37,553,642	45,604,196	63,434,244	32,027,373

[1] Figures not available. [2] By water only. [3] Elevator burned. No grain since 1924.

Rye.—Table No. 82 contains information as to the amounts of rye received at the lower lake ports during the period under consideration. More rye was received in 1924 than in any other year of the period. The average receipts for the entire period were 25,004,442 bushels, of which Buffalo received more than half.

TABLE NO. 82.—*Rye receipts at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor					1,706,023
Tiffin					5,014,192
Midland					522,165
Port McNicoll					9,694,852
Goderich					769,724
Port Huron	(1)	131,739	364,383	22,903	
Detroit	94,370	121,297	138,143	122,696	335,000
Toledo	772,165	777,600	846,800	1,073,800	916,000
Cleveland	38,610	28,309	68,893	19,649	60,089
Fairport	716,027	1,306,268	2,518,704	333,228	1,074,894
Erie	1,587,098		1,149,741	1,195,168	705,936
Port Colborne					6,543,571
Buffalo	[2] 17,108,726	[2] 9,251,550	[2] 28,083,305	[2] 15,091,121	21,683,358
Total	20,316,996	11,616,763	33,169,969	17,858,565	49,025,976

[1] Figures not available. [2] By water only.

TABLE NO. 82.—*Rye receipts at lower lake ports, 1920–1928*—Continued

[Quantities in bushels]

Port	1925	1926	1927	1928	Average 1920–1928
Depot Harbor	367,766		476,967	536,025	342,976
Tiffin	408,511	829,775	3,854,447	1,343,048	1,272,219
Midland	64,081	248,631	1,253,899	2,338,399	491,908
Port McNicoll	1,269,022	1,252,789	5,497,190	602,645	2,035,166
Goderich		107,511	952,080	434,677	251,555
Owen Sound			1,464,977	802,077	251,895
Sarnia			33,875	165,320	22,133
Port Huron [3]					57,669
Detroit	283,000	246,000	420,000	246,000	222,945
Toledo	142,000	257,000	225,000	89,000	566,595
Cleveland			163		23,968
Fairport	246,783			885,590	786,833
Erie	1,023,824	418,069	396,763		719,622
Port Colborne	2,709,158	5,354,214	16,435,170	5,731,866	4,085,998
Buffalo	7,528,003	6,947,409	11,439,244	[2] 7,723,917	13,872,959
Total	14,042,148	15,661,398	42,449,775	20,898,564	25,004,442

[2] By water only.
[3] Elevator burned. No grain since 1924. 1924 figure represents receipts by water only.

Other grain.—With the exception of the figures showing receipts at Detroit, the amounts specified in the following table indicate receipts of flaxseed. Detroit figures indicate chiefly buckwheat, with small amounts of flaxseed in some years. Buffalo received over half of the total amount of other grain entering lower lake ports. The unusually large tonnage at Buffalo during the first four years of the period is accounted for by the fact that large quantities of flax were received in those years from Argentina via the Barge Canal. The amounts of Argentina flax received are shown in Table No. 87. The average annual receipts at the 10 lower lake ports listed amounted to 12,431,321 bushels.

TABLE NO. 83.—*Other grain receipts at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor	59,990	174,425	717,193	457,175	
Port McNicoll	4,801,241	4,271,032	6,303,467	1,299,936	248,877
Tiffin	2,508,473	2,145,858	3,011,957	378,562	
Midland	1,857,194	167,182	1,715,538	931,211	
Goderich	422,931	326,508	527,910	83,782	400,607
Detroit	50,341	33,620	2,500	58,368	(1)
Toledo	(2)	(2)	(2)	(2)	[3] 995,570
Port Colborne		779,776	3,252,240	4,226,792	69,969
Buffalo	[1] 4,219,471	[1] 6,269,128	[1] 4,198,532	[1] 8,911,169	14,046,485
Total	13,919,641	14,167,529	19,729,337	16,346,995	15,761,508

Port	1925	1926	1927	1928	Average 1920–1928
Depot Harbor					156,531
Port McNicoll	178,007	218,701	59,955	57,814	1,937,670
Tiffin		59,863	49,999		906,079
Midland				39,903	523,447
Owen Sound			59,963	72,692	14,739
Goderich	265,246	305,198	571,043	140,338	338,174
Detroit	(2)	(2)	(2)	(2)	16,092
Toledo	[3] 1,015,869	[3] 810,785	[3] 820,290	[3] 1,050,351	521,429
Port Colborne	115,555	280,479	566,943	1,016,100	1,145,317
Buffalo	8,061,758	4,059,188	6,426,885	5,653,952	6,871,841
Total	9,636,435	5,734,214	8,555,078	8,031,150	12,431,321

[1] By water only. [2] Figures not available. [3] Represents water receipts of flaxseed only.

Receipts of all grains.—Table No. 84 shows receipts of all grains by ports, while Table No. 85 shows the total receipts of each kind of grain at lower lake ports during the period 1920–1928.

TABLE NO. 84.—*Receipts of all grain at lower lake ports, 1920–1928*

[Quantities in bushels]

Port	1920	1921	1922	1923	1924
Depot Harbor	4, 031, 876	14, 755, 139	13, 113, 163	6, 182, 369	12, 292, 348
Port McNicoll	33, 604, 109	59, 138, 955	48, 215, 616	34, 274, 988	36, 716, 759
Tiffin	22, 206, 036	30, 844, 662	24, 604, 370	26, 083, 059	26, 485, 787
Midland	12, 004, 062	16, 177, 139	18, 045, 088	17, 890, 641	12, 649, 632
Collingwood	(1)	1, 364, 354	1, 033, 109	2, 652, 929	2, 066, 292
Goderich	10, 954, 546	19, 120, 785	19, 788, 605	18, 084, 997	21, 014, 410
Port Huron	(1)	2, 905, 298	4, 596, 370	925, 784	1, 564, 810
Detroit	3, 403, 561	3, 237, 519	3, 783, 289	4, 483, 486	4, 544, 000
Toledo	12, 878, 335	17, 086, 475	18, 408, 938	23, 207, 204	26, 124, 570
Cleveland	7, 931, 369	9, 713, 014	7, 547, 802	6, 037, 374	5, 279, 141
Fairport	2, 396, 092	3, 775, 038	6, 855, 186	2, 415, 711	2, 305, 102
Erie	4, 445, 910	1, 203, 335	12, 313, 147	10, 604, 410	9, 479, 592
Port Colborne	16, 597, 916	62, 725, 323	71, 774, 736	76, 521, 954	92, 273, 880
Buffalo	[2] 111, 363, 235	[2] 218, 693, 128	[2] 262, 170, 033	[2] 184, 983, 054	287, 326, 986
Total	241, 817, 047	460, 740, 164	512, 249, 452	414, 347, 960	540, 123, 309

Port	1925	1926	1927	1928	Average (1920–1928)
Depot Harbor	8, 898, 349	5, 622, 541	7, 173, 233	11, 943, 452	9, 334, 719
Port McNicoll	27, 011, 393	30, 939, 386	25, 812, 823	23, 744, 231	35, 495, 362
Tiffin	22, 410, 948	22, 833, 154	20, 767, 613	20, 749, 263	24, 109, 432
Midland	12, 885, 455	11, 390, 730	14, 146, 015	28, 654, 143	15, 982, 545
Collingwood	2, 228, 383	225, 567	599, 230	1, 124, 285	1, 254, 905
Goderich	16, 404, 211	17, 704, 261	16, 054, 283	16, 128, 705	17, 250, 533
Port Huron [2]	----------	----------	----------	----------	1, 110, 251
Detroit	4, 152, 000	5, 178, 000	4, 656, 000	4, 208, 000	4. 182, 873
Toledo	23, 109, 869	24, 811, 785	29. 454, 290	20, 467, 351	21, 727, 646
Cleveland	4, 605, 138	5, 205, 893	4, 325, 399	3, 914, 108	6, 062, 138
Fairport	4, 158, 900	7, 345, 404	4, 616, 188	7, 680, 588	4, 616, 467
Erie	5, 081, 392	2, 384, 292	3, 820, 180	5, 469, 173	6, 089, 048
Port Colborne	75, 562, 770	93, 351, 612	108, 604, 198	107, 149, 144	78, 284, 615
Buffalo	268, 921, 559	209, 491, 856	257, 734, 401	279, 643, 420	231, 147, 519
Owen Sound	1, 277, 531	4, 785, 389	10, 589, 135	9, 768, 126	2, 935, 576
Sarnia	----------	----------	983, 209	[3] 4, 930, 306	657, 057
Total	476, 707, 898	441, 269, 870	509, 336, 197	545, 574, 295	460, 240, 688

[1] Figures not available. [2] By water only. [3] Elevator burned. No grain after 1924.

TABLE NO. 85.—*Receipts of all grain at lower lake ports, 1920–1928, by kinds of grain*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Other	Total
1920	159, 794, 563	25, 620, 393	12, 677, 624	9, 487, 830	20, 316, 996	13, 919, 641	241, 817, 047
1921	235, 966, 149	77, 383, 374	104, 952, 537	16, 653, 812	11, 616, 763	14, 167, 529	460, 740, 164
1922	308, 981, 157	55, 251, 084	78, 252, 142	16, 865, 763	33, 169, 969	19, 729, 337	512, 249, 452
1923	298, 075, 920	41, 910, 218	23, 139, 834	17, 016, 428	17, 858, 565	16, 346, 995	414, 347, 960
1924	345, 901, 358	67, 170, 993	27, 810, 941	34, 452, 705	49, 025, 804	15, 761, 508	540, 123, 309
1925	300, 691, 188	84, 852, 144	20, 308, 248	47, 177, 735	14, 042, 148	9, 636, 435	476, 707, 898
1926	303, 215, 922	53, 896, 165	25, 208, 529	37, 553, 642	15, 661, 398	5, 734, 214	441, 269, 870
1927	348, 201, 206	36, 292, 140	28, 233, 802	45, 604, 196	42, 449, 775	8, 555, 078	509, 336, 197
1928	394, 626, 975	37, 522, 861	21, 060, 501	63, 434, 244	20, 898, 564	8, 031, 150	545, 574, 295
Average	299, 494, 938	53, 322, 152	37, 960, 462	32, 027, 373	25, 004, 442	12, 431, 321	460, 240, 688

RECEIPTS AT LOWER LAKE PORTS BY WATER AND BY RAIL

The figures given in the preceding tables showing receipts at lower lake ports cover both water and rail. In so far as available data will permit, the following table segregates the receipts at each port by water and by rail. Information is lacking regarding the rail receipts at Buffalo for several years of the period, and sufficient data are not available to make it possible to segregate the receipts by rail and by water at Cleveland during the first four years of the period.

The table shows that very little grain is received by rail at the ports on Georgian Bay and Lake Huron. At Detroit, Toledo, and Cleveland the greater proportion of the grain enters by rail routes, while at Fairport, Erie, Buffalo, and Port Colborne receipts by water far exceed receipts by rail. During the 9-year period 93.2 per cent of the grain entering the 16 lower lake ports listed utilized the water route, while 6.8 per cent entered by rail.

TABLE NO. 86.—*Grain receipts at lower lake ports, 1920 to 1928, by water and rail*

[Quantities in bushels]

BY WATER

Receiving port	1920	1921	1922	1923	1924	1925	1926	1927	1928	Average 1920–1928
Depot Harbor	4,031,876	14,755,139	13,113,163	6,182,369	12,292,348	8,898,349	5,622,541	7,173,233	11,943,452	9,334,719
Port McNicoll	33,604,109	59,138,955	48,215,616	34,274,988	36,716,759	27,011,393	30,939,386	25,812,823	23,744,231	35,495,362
Tiffin	22,206,036	30,844,662	24,604,370	26,083,059	26,485,787	22,410,948	22,833,154	20,767,613	20,749,263	24,109,432
Midland	12,004,062	16,177,139	18,045,088	17,890,641	12,649,632	12,885,455	11,390,730	14,146,015	28,654,143	15,982,545
Collingwood	(1)		1,033,109	2,652,929	2,066,292	2,228,383	225,567	599,230	1,124,285	1,103,311
Owen Sound						1,277,531	4,774,106	10,589,135	9,768,126	2,934,322
Goderich	10,954,546	19,120,785	19,788,605	18,084,997	21,014,410	16,404,211	17,701,911	16,052,633	16,128,705	17,250,089
Sarnia								983,209	4,930,306	657,057
Port Huron	(1)	2,700,732	4,351,230	902,881	1,564,810	(2)	(2)	(2)	(2)	1,057,739
Detroit	457,899	476,695	208,990	441,312	475,670	235,260	204,033	409,942	334,038	360,427
Toledo	1,781,756	3,018,387	5,970,145	7,056,915	7,920,121	10,254,553	5,511,186	9,390,768	10,096,418	6,777,806
Cleveland	(1)	(1)	(1)	(1)	290,000	350,000	300,000	320,000	300,000	173,333
Fairport	2,396,092	2,855,465	6,855,186	2,415,711	2,305,102	4,158,900	7,345,404	4,616,188	7,680,588	4,514,293
Erie	4,445,910	1,203,335	12,313,147	10,604,410	9,479,592	5,081,392	2,384,292	3,820,180	5,469,173	6,089,048
Port Colborne	16,545,066	62,171,475	71,749,462	76,507,573	91,883,035	75,558,493	91,742,421	108,492,931	106,807,084	77,939,727
Buffalo	111,363,235	218,693,128	262,170,033	184,983,054	251,423,000	246,524,966	209,472,712	233,730,000	279,643,420	222,000,394
Total	219,790,587	431,155,897	488,418,144	388,080,839	476,566,558	433,279,834	410,447,443	456,903,900	527,373,232	425,779,604
Per cent by water	94.0	95.6	96.7	95.3	88.2	90.9	93.0	89.7	96.6	93.2

Depot Harbor										
Port McNicoll										
Tiffin										
Midland										
Collingwood	(1)	1,364,354								151,595
Owen Sound							11,283			1,254
Goderich							2,350	1,650		444
Sarnia										
Port Huron	(1)	204,566	245,140	22,903		(2)	(2)	(2)	(2)	52,512
Detroit	2,945,662	2,760,824	3,574,299	4,042,174	4,068,330	3,916,740	4,973,967	4,246,058	3,873,962	3,822,446
Toledo	11,096,579	14,068,088	12,438,793	16,150,289	18,204,449	12,855,316	19,300,599	20,063,522	10,370,933	14,949,841
Cleveland	(1)	(1)	(1)	(1)	4,989,141	4,255,138	4,905,893	4,005,399	3,614,108	2,418,853
Fairport		919,573								102,175
Erie										
Port Colborne	52,850	553,848	25,274	14,381	390,845	4,277	1,609,191	111,267	342,060	344,888
Buffalo	(1)	(1)	(1)	(1)	35,903,986	22,396,593	19,144	24,004,401	(1)	9,147,125
Total	14,095,091	19,871,253	16,283,506	20,229,747	63,556,751	43,428,064	30,822,427	52,432,297	18,201,063	30,991,173
Per cent by rail	6.0	4.4	3.3	4.7	11.8	9.1	7.0	10.3	3.4	6.8
Grand total	[3] 233,885,678	[3] 451,027,150	[3] 504,701,650	[3] 408,310,586	540,123,309	476,707,898	441,239,870	509,336,197	545,574,295	456,707,737

[1] Figures not available.

[2] Elevator burned. No grain after 1924.

[3] Not including Cleveland grain and rail receipts at Buffalo.

RECEIPTS AT LOWER LAKE PORTS BY NATIONALITY OF GRAIN

In 1920, the first year of the period, 43.5 per cent of the grain received at the 16 lower lake ports listed originated in the United States, 55.8 per cent came from Canada, and the remainder consisted of flax imported from Argentina. By 1928, the last year of the period, the situation had changed considerably, only 35.1 per cent of the grain receipts coming from the United States while 64.9 per cent came from Canada. The greater part of the Canadian grain received at these ports came via the lake route from Fort William-Port Arthur, which again emphasizes the importance of the tremendous flow of grain, particularly of wheat, from that port.

The elevators at the Canadian ports of Depot Harbor and Collingwood are used by Chicago firms, and during the nine years for which statistics are available these ports handled chiefly United States grain coming by water from Lake Superior and Lake Michigan ports. Considering the year 1928 alone, however, Depot Harbor received 7,771,629 bushels of Canadian grain as compared to 4,171,823 bushels of United States grain. The total amount of Canadian grain received at this port during the remaining eight years of the period was 5,556,753 bushels. The unusually large Canadian receipts in 1928 were caused by the unprecedented flow from Fort William-Port Arthur in that year. The receipts of grain at Owen Sound during the four years 1925 to 1928, inclusive, were more evenly divided, an annual average of 1,711,865 bushels of United States grain having reached the port in comparison with 1,223,711 bushels of Canadian grain.

In contrast with the above situation, the United States ports of Buffalo, Erie, and Fairport received more Canadian grain during the period than United States grain. The routing of Canadian grain through these ports is due mainly to the inability of the Canadian transfer elevators, and of the vessel and navigation facilities handling grain by way of the Welland Canal and St. Lawrence River. Most of the grain entering Erie and Fairport is transshipped by rail, while that received at Buffalo is forwarded by both water and rail routes.

TABLE NO. 87.—*Grain receipts at lower lake ports 1920–1928, by nationality of grain*

[Quantities in bushels]

UNITED STATES GRAIN

Receiving port	1920	1921	1922	1923	1924	1925	1926	1927	1928	Average
Depot Harbor	4,031,876	14,755,139	12,892,355	4,375,797	10,373,799	8,898,349	5,622,541	5,562,409	4,171,823	7,853,788
Port McNicoll	12,318,265	21,229,148	24,061,839	4,168,957	20,251,168	6,997,286	8,801,820	20,241,883	10,566,436	14,292,978
Tiffin	6,249,377	17,083,518	11,647,170	2,714,318	12,907,638	7,142,811	10,869,629	15,558,782	10,519,124	10,521,374
Midland	4,177,597	814,310	3,302,293	908,532	553,165	669,123	1,082,516	5,429,765	4,309,340	2,360,738
Collingwood	(1)	1,364,354	743,679	2,500,773	2,066,292	2,228,383	225,567	599,230	1,124,285	1,205,840
Owen Sound						223,766	2,952,784	7,211,353	5,018,878	1,711,865
Goderich	112,475	3,487,576	1,777,755	1,282,433	1,427,576	428,208	1,289,881	2,796,083	3,497,458	1,788,827
Sarnia									2,449,048	272,116
Port Huron [2]	(1)	2,086,718	739,896	56,658	892,409					419,520
Detroit	3,153,767	3,077,006	3,673,799	4,262,586	4,068,330	4,152,000	5,178,000	4,563,840	4,208,000	4,037,481
Toledo	11,211,560	15,213,196	13,499,863	17,597,018	24,083,925	21,650,088	24,286,191	27,620,688	16,812,314	19,108,316
Cleveland	(1)	(1)	(1)	(1)	5,279,141	4,605,138	5,205,893	4,325,399	3,914,108	2,592,187
Fairport	2,286,162	3,775,038	4,171,453	333,228	1,074,894	246,783		809,957	330,083	1,447,511
Erie	4,445,910	407,681	4,039,466	5,220,098	1,836,503	3,145,637		25,252		2,124,505
Port Colborne	249,080	34,470,353	23,784,524	25,139,656	23,073,773	11,345,653	15,326,961	38,667,314	30,811,801	22,541,013
Buffalo	53,259,963	125,194,781	128,988,477	63,435,416	177,279,986	122,743,559	80,317,856	122,495,401	94,037,159	107,528,066
Total	101,496,032	242,958,818	233,322,569	131,995,470	285,168,599	194,476,784	161,159,639	255,907,356	191,769,862	199,806,125
Per cent United States grains	43.5	53.9	46.2	32.3	52.8	40.7	36.5	50.2	35.1	43.7

[1] Not available.

[2] No grain after 1924.

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TABLE NO. 87.—*Grain receipts at lower lake ports 1920 to 1928, by nationality of grain*—Continued

[Quantities in bushels[

CANADIAN GRAIN

Receiving port	1920	1921	1922	1923	1924	1925	1926	1927	1928	Average
Depot Harbor			220,808	1,806,572	1,918,549			1,610,824	7,771,629	1,480,931
Port McNicoll	21,285,844	37,909,807	24,153,777	30,106,031	16,465,591	20,014,107	22,137,566	5,570,940	13,177,795	21,202,384
Tiffin	15,956,659	13,761,144	12,957,200	23,368,741	13,578,149	15,268,137	11,963,525	5,208,831	10,230,139	13,588,058
Midland	7,826,465	15,362,829	14,742,795	16,982,109	12,096,467	12,216,332	10,308,214	8,716,250	24,344,803	13,621,807
Collingwood	(1)		289,430	152,156						49,065
Owen Sound						1,053,765	1,832,605	3,377,782	4,749,248	1,223,711
Goderich	10,842,071	15,633,209	18,010,850	16,802,564	19,586,834	15,976,003	16,414,380	13,258,200	12,631,247	15,461,707
Sarnia								983,209	2,481,258	384,941
Port Huron [2]	(1)	818,580	3,856,474	869,126	672,401					690,731
Detroit	249,794	160,513	109,490	220,900	475,670			92,160		145,392
Toledo	1,666,775	1,873,279	4,909,075	5,610,186	2,040,645	1,459,781	525,594	1,833,602	3,655,037	2,619,331
Cleveland	(1)	(1)	(1)	(1)						
Fairport	109,930		2,683,733	2,082,483	1,230,208	3,912,117	7,345,404	3,806,231	7,350,500	3,168,956
Erie		795,654	8,273,681	5,384,312	7,643,089	1,935,755	2,384,292	3,794,928	5,469,173	3,964,543
Port Colborne	16,348,836	28,254,970	47,990,212	51,382,298	69,200,107	64,217,117	78,024,651	69,936,884	76,337,343	55,743,602
Buffalo	55,555,974	93,129,031	131,865,827	118,755,451	[3] 110,047,000	[3] 146,178,000	[3] 129,174,000	[3] 135,239,000	185,606,261	122,838,949
Total	129,842,348	207,699,016	270,063,352	273,522,929	254,954,710	282,231,114	280,110,231	253,428,841	353,804,433	256,184,108
Per cent Canadian grains	55.5	46.0	53.5	67.0	47.2	59.2	63.5	49.8	64.9	56.0

ARGENTINA FLAX

Buffalo	2,547,298	369,316	1,315,729	2,792,187						
Grand totals	[4] 233,885,678	[4] 451,027,150	[4] 504,701,650	[4] 408,310,586	540,123,309	476,707,898	441,269,870	509,336,197	545,574,295	456,707,737

[1] Not available.

[2] No grain after 1924.

[3] From Millers' Almanack.

[4] Not including Cleveland grain.

SHIPMENTS FROM LOWER LAKE AND ST. LAWRENCE RIVER PORTS

Except for the grain required for domestic use at lower lake ports, receipts at these ports, both by water and by rail, are forwarded mainly to the seaboard for export and for domestic consumption. A much smaller amount is forwarded to interior points for milling. Table No. 88 shows the shipments during the year 1928 from certain of the United States lower lake and St. Lawrence River ports, segregated by kinds of grain, with the amounts utilizing water and rail routes. No information is available as to the total amount of grain shipped from Detroit. Records of rail shipments are not so complete as the records of water shipments, but this table bears out the statement previously made that most of the grain entering lower lake ports, with the exception of Buffalo, moves out by rail.

TABLE NO. 88.—*Shipments from United States lower lake and St. Lawrence River ports via water and rail, during the calendar year 1928*

[Quantities in bushels]

From	Wheat	Oats	Corn	Barley	Rye	Total	Amount shipped by water	Amount shipped by rail
Toledo	6,317,575	2,249,780	471,205	41,675	35,660	9,115,134	99,134	9,016,851
Cleveland	197,044	756,208	1,590,502	8,371		2,552,125		2,552,125
Fairport	6,637,592	138,270		128,000	866,000	7,769,862	994,000	6,775,862
Erie	5,420,850					5,420,850	948,243	4,472,607
Buffalo	77,576,457	807,336	192,704	6,690,131	771,748	86,038,376	68,415,953	17,622,423
Ogdensburg	7,000	534,097	36,074	861,600	3,640	1,442,411	34,776	1,407,635
Oswego	106,931					106,931	52,509	54,422

DESTINATION OF GRAIN SHIPPED BY WATER FROM LOWER LAKE AND ST. LAWRENCE RIVER PORTS DURING THE CALENDAR YEAR 1928

Buffalo and Port Colborne are the principal lower lake shipping ports as well as receiving ports for grain. Most of the grain received at Buffalo is transshipped by water, although considerable quantities are consumed by the mills and shipped out by rail routes. During the calendar year 1928 a total of 106,883,383 bushels of grain were shipped by water from Buffalo, 68,415,953 bushels of which went to St. Lawrence River points, chiefly Montreal, and 38,467,430 bushels to New York via the Barge Canal. Grain received at Port Colborne is transshipped to small type vessels operating through the Welland Canal and St. Lawrence River to Montreal and other points. A total of 93,167,389 bushels of grain were shipped by water from Port Colborne in 1928.

Table No. 89 gives details of the shipments by water from lower lake and St. Lawrence River ports during the calendar year 1928.

TABLE NO. 89.—*Destination of grain shipped by water from lower lake and St. Lawrence River ports during the calendar year 1928*

[Quantities in bushels]

From	To	Wheat	Oats	Corn	Barley	Rye	Other	Total
Sarnia	New York via Oswego	52,000						52,000
	Montreal	83,000						83,000
								135,000
Toledo	do	99,134						99,134
Fairport	do				128,000	866,000		994,000
Erie	do	948,243						948,243
Buffalo	Kingston			58,174				58,174
	Montreal	59,392,845	425,945		5,766,643	442,189		66,027,622
	Quebec		175,927					175,927
	Various St. Lawrence River points.			134,530				134,530
	New York via Oswego	1,781,200				238,500		2,019,700
								68,415,953
	New York via Barge Canal.	31,564,233		66,679	5,828,625	1,007,893		38,467,430
Port Colborne	Toronto	1,135,128	584,107			41,441	74,444	1,835,120
	Kingston	221,950			816,817			1,038,767
	Montreal	52,986,671	10,711,516		15,109,476	5,300,293	701,780	84,809,736
	Quebec	4,371,071	1,027,109		85,586			5,483,766
								93,167,389
Oswego	New York via Barge Canal.	52,509						52,509
Ogdensburg	Montreal		34,766					34,766

DESTINATION OF GRAIN SHIPPED BY RAIL AT SPECIFIED LOWER LAKE AND ST. LAWRENCE RIVER PORTS DURING 1928

As already stated, records of rail shipments are not complete, and the figures presented in this table should not be construed as a complete statement of rail grain shipped from these ports. They are of interest, however, in showing the territory served by the rail lines.

TABLE NO. 90.—*Destination of grain shipped by rail at specified lower lake and St. Lawrence River ports during the calendar year 1928* [1]

[Quantities in bushels]

From	To	Wheat	Oats	Corn	Barley	Rye	Total
Ogdensburg	New York	7,000	134,625		861,600	3,640	1,006,865
Oswego	Boston	26,442					26,442
	Watertown	20,000					20,000
	Ogdensburg	7,980					7,980
							54,422
Buffalo	New York	16,402,412	205,464		923,488	91,059	17,622,423
Erie	New York	3,355,952					3,355,952
	Philadelphia	544,167					544,167
	Baltimore	557,514					557,514
	Norfolk	14,974					14,974
							4,472,607
West Fairport	Akron		138,270				138,270
	Baltimore	2,844,232					2,844,232
	Philadelphia	3,748,852					3,748,852
							6,731,354

[1] This is not a complete record of rail shipments at lower lake ports, but represents available data only.

TABLE NO. 90.—*Destination of grain shipped by rail at specified lower lake and St. Lawrence River ports during the calendar year 1928*—Continued

[Quantities in bushels]

From	To	Wheat	Oats	Corn	Barley	Rye	Total
Detroit	Michigan	13,269	6,000	16,000	3,750		39,019
	New York	14,299	30,900	2,200	6,600	13,955	67,882
	New Hampshire	1,415					1,415
	Pennsylvania	1,500	29,200				30,700
	Virginia	8,700					8,700
	North Carolina	3,766					3,766
	New England States		33,600				33,600
	New Jersey		2,000				2,000
	Massachusetts					1,100	1,100
	Maryland					2,100	2,100
	Ontario			20,986			20,986
							211,268

RECEIPTS OF GRAIN AT LAKE ONTARIO AND UPPER ST. LAWRENCE RIVER PORTS

As indicated by the preceding tables, the larger share of the grain moving down the Great Lakes has its immediate destination at ports on Lake Erie, Georgian Bay, Lake Huron, and connecting channels. Some grain moves direct from upper lake ports to Montreal and to ports on Lake Ontario and the upper St. Lawrence River, while some is transferred at Lake Erie ports and thence moves to the ports indicated. The principal grain receiving ports on Lake Ontario are Toronto and Kingston, and the principal upper St. Lawrence River port is Ogdensburg.

RECEIPTS BY PORTS AND KINDS OF GRAIN

Tables Nos. 91 to 95, inclusive, contain information regarding the amounts of each kind of grain received at Lake Ontario and upper St. Lawrence River ports during the period 1920–1928. Table No. 96 shows the total receipts of grain at each port.

TABLE NO. 91.—*Receipts of wheat at Lake Ontario and upper St. Lawrence River ports, 1920–1928*

[Quantities in bushels]

Year	Oswego	Toronto [1]	Kingston [1]	Ogdensburg	Total
1920		833,685	34,435		868,120
1921		738,794	14,089		752,883
1922			35,074	119,330	154,404
1923					
1924			7,453	574,124	581,577
1925	917,612		65,429	269,800	1,252,841
1926			812,448	225,104	1,037,552
1927	106,931		168,229	358,673	633,833
1928	25,085	519,162	22,158	7,000	573,405
Average	116,625	232,405	128,813	172,670	650,513

[1] Crop year 1920–1923, inclusive.

TABLE NO. 92.—*Receipts of oats at Lake Ontario and upper St. Lawrence River ports, 1920–1928*

[Quantities in bushels]

Year	Toronto [1]	Kingston [1]	Ogdensburg	Total
1920	256,481	47,797	----------	304,278
1921	191,948	87,122	----------	279,070
1922	----------	205,628	50,426	256,054
1923	----------	519,830	450,051	924,881
1924	----------	458,852	506,625	965,477
1925	----------	519,169	826,537	1,345,706
1926	----------	2,273,925	376,062	2,649,987
1927	----------	517,249	1,213,951	1,731,200
1928	----------	162,957	1,563,485	1,726,442
Average	49,826	532,503	549,126	1,131,455

[1] Crop year 1920–1923, inclusive.

TABLE NO. 93.—*Receipts of corn at Lake Ontario and upper St. Lawrence River ports, 1920–1928*

[Quantities in bushels]

Year	Kingston	Ogdensburg	Total
1920	----------	----------	----------
1921	----------	----------	----------
1922	----------	976,495	976,495
1923	----------	1,508,943	1,508,943
1924	----------	2,441,676	2,441,676
1925	----------	1,117,500	1,117,500
1926	86,565	30,276	116,841
1927	55,098	566,109	621,207
1928	61,625	----------	61,625
Average	22,588	737,889	760,477

TABLE NO. 94.—*Receipts of barley at Lake Ontario and upper St. Lawrence River ports, 1920–1928*

[Quantities in bushels]

Year	Ogdensburg	Toronto [1]	Kingston [1]	Total
1920	----------	37,946	----------	37,946
1921	----------	10,915	6,698	17,613
1922	----------	----------	----------	----------
1923	----------	----------	77,651	77,651
1924	485,500	----------	1,837	487,337
1925	185,500	----------	142,825	328,325
1926	154,139	----------	491,971	646,110
1927	566,093	----------	----------	566,093
1928	861,600	----------	2,521	864,121
Average	250,315	5,429	80,389	336,133

[1] Crop years 1920–1923, inclusive.

TABLE NO. 95.—*Receipts of rye at Lake Ontario and upper St. Lawrence River ports, 1920–1928*

[Quantities in bushels]

Year	Toronto	Kingston	Ogdensburg	Total
1920	----------	----------	----------	----------
1921	----------	----------	----------	----------
1922	----------	----------	----------	----------
1923	----------	----------	----------	----------
1924	----------	----------	208,836	208,836
1925	----------	----------	----------	----------
1926	----------	186,557	2,808	189,365
1927	----------	83,893	9,000	92,893
1928	62,731	435,004	3,640	501,375
Average	6,970	78,384	24,920	110,274

TABLE NO. 96.—*Receipts of all grain at Lake Ontario and upper St. Lawrence River ports, 1920–1928*

[Quantities in bushels]

Year	Oswego	Toronto	Kingston	Ogdensburg	Total
1920		1,128,112	82,232		1,210,344
1921		941,657	107,909		1,049,566
1922			240,702	1,146,251	1,386,953
1923			597,481	1,913,994	2,511,475
1924			468,142	4,216,761	4,684,903
1925	917,612		727,423	2,399,337	4,044,372
1926			3,851,466	788,389	4,639,855
1927	106,931		824,469	2,713,826	3,645,226
1928	25,085	[1] 683,595	684,265	2,435,725	3,828,670
Average	116,625	305,929	842,677	1,734,920	3,000,151

[1] Includes 101,702 bushels of flax.

RECEIPTS BY RAIL AND BY WATER

During the 9-year period, an average of 2,055,101 bushels of grain or 68.5 per cent of the total receipts at Lake Ontario and upper St. Lawrence River ports utilized the water route, while an average of 945,050 bushels or 31.5 per cent of the total arrived at these ports by rail.

TABLE NO. 97.—*Receipts of grain at Lake Ontario and upper St. Lawrence River ports, by rail and water, 1920–1928*

[Quantities in bushels]

BY WATER

Year	Oswego	Toronto	Kingston	Ogdensburg	Total	Per cent
1920			34,435		34,435	2.8
1921			39,978		39,978	3.8
1922			191,653	1,146,251	1,337,904	96.5
1923			572,509	1,913,994	2,486,503	99.0
1924			321,615	3,426,347	3,747,962	80.4
1925	917,612		483,429	1,913,650	3,314,691	81.9
1926			3,803,546	30,276	3,833,822	82.6
1927	78,951		468,173	1,703,260	2,250,384	61.7
1928		[1] 679,059	58,174	713,000	1,450,233	37.9
Average	110,729	75,451	663,722	1,205,198	2,055,101	68.5

BY RAIL

1920		1,128,112	47,797		1,175,909	97.2
1921		941,657	67,931		1,009,588	96.2
1922			49,049		49,049	3.5
1923			24,972		24,972	1.0
1924			146,527	790,414	936,941	19.6
1925			243,994	485,687	729,681	18.1
1926			47,920	758,113	806,033	17.4
1927	27,980		356,296	1,010,566	1,394,842	38.3
1928	25,085	4,536	626,091	1,722,725	2,378,437	62.1
Average	5,896	230,478	178,953	529,723	945,050	31.5

[1] Includes 101,702 bushels of flax.

RECEIPTS BY NATIONALITY OF GRAIN

Forty-seven and eight-tenths per cent of the grain received at the ports in question originated in the United States, while 52.2 per cent originated in Canada. During the 9-year period, Toronto received no United States grain. Further details are shown in Table No. 98, which follows.

TABLE NO. 98.—*Receipts of grain at Lake Ontario and upper St. Lawrence River ports, by nationality of grain, 1920–1928*

[Quantities in bushels]

UNITED STATES GRAIN

Year	Oswego	Toronto	Kingston	Ogdensburg	Total	Per cent
1920						
1921						
1922				1,146,251	1,146,251	82.6
1923				1,913,994	1,913,994	76.2
1924				3,426,347	3,426,347	73.4
1925				1,913,650	1,913,650	47.3
1926			1,035,079	30,276	1,065,355	23.0
1927	54,422		55,098	1,776,060	1,885,580	51.7
1928	25,085		61,625	1,428,860	1,515,570	39.6
Average	8,834		127,978	1,292,826	1,429,638	47.8

CANADIAN GRAIN

1920		1,128,112	82,232		1,210,344	100.0
1921		941,657	107,909		1,049,566	100.0
1922			240,702		240,702	17.4
1923			597,481		597,481	23.8
1924			468,142	790,414	1,258,556	26.6
1925	917,612		727,423	485,687	2,130,722	53.7
1926			2,816,387	758,113	3,574,500	77.0
1927	52,509		769,371	937,766	1,759,646	48.3
1928		683,595	622,640	1,006,865	2,313,100	60.4
Average	107,791	305,929	714,699	442,094	1,570,513	52.2

FLOW OF GRAIN ON THE GREAT LAKES AND ST. LAWRENCE RIVER, 1928

The annual cycle of the flow of grain on the Great Lakes may be briefly summarized as follows: The opening of navigation normally finds the elevators at Fort William-Port Arthur filled to capacity and there is generally a large amount of grain in storage at Duluth-Superior. With the opening of navigation there is a rush of grain by way of the lake route. This creates a spring peak generally within the month following the opening of navigation. When this winter storage has been disposed of, the grain traffic subsides until July, when the first movements of winter wheat reach Chicago and Milwaukee. As already shown, Chicago does not ship as much grain by water as by rail, and this first movement of the new crop by way of the Lakes is not generally very heavy. It is joined, however, in August by the spring wheat from Minnesota and the Dakotas, moving through Duluth-Superior. On or about September 1, the tremendous flow of wheat from the Canadian prairie Provinces, focusing directly upon Fort William-Port Arthur, joins the flow of winter and spring American wheat, and from this time until the close of navigation the

facilities of the transfer elevators and of the Welland and St. Lawrence Canals are taxed to the limit. The heaviest flow is usually during November, but not all the grain seeking the water route can be accommodated at the lower lake ports and Montreal and there is therefore usually a large amount left over in vessels and in elevators at upper lake ports and intermediate transfer ports, such as those on Georgian Bay. Grain at the latter elevators moves throughout the winter season to the seaboard and to interior consuming points, and this is true to some extent of the grain left in elevators at upper lake ports, but the larger share of the latter is held over for shipment during the following season.

It has already been explained that considerable grain recorded as shipped from the upper lake ports in one year actually remains in winter storage at the head of the Lakes and is not moved down until the following season. Similarly a large amount of grain arriving at lower lake ports during the fall months remains in vessel storage and is not received into the elevators until the ensuing year. For these reasons records of shipments from upper lake ports do not and should not balance. Aside from these important differences, there are also minor differences due to shortages and overages in the turnouts from vessels as compared with the loadings, and there are also differences in the records of destination due to diversion of vessels while en route.

After considering the situation as described above, it is evident that the records of the upper lake shipping ports and of the lower lake receiving ports can not be used to illustrate the volume of flow on the Great Lakes. The destinations of shipments from upper lake ports have already been shown in Tables Nos. 71 to 77, inclusive, while the destinations of shipments from lower lake and St. Lawrence River ports are shown in Table No. 89. Based upon these records of shipping ports and taking no account of diversions in traffic and grain left in storage, charts have been prepared showing the flow of each kind of grain separately and a separate chart covering the movement of all grain.

These charts show clearly the supremacy of the Lake Superior ports in the shipments of wheat, oats, barley, rye, and flax, and of the Lake Michigan ports in the shipments of corn. Fort William-Port Arthur ranked first in the shipment of wheat, oats, and barley, Duluth-Superior in the shipment of rye and flax, and Chicago in the shipment of corn. During the year 1928 shipments of grain via water from the upper lake ports aggregated 572,282,575 bushels, of which 385,961,444 bushels, or 67.3 per cent, originated at Fort William-Port Arthur; 145,228,980 bushels, or 25.4 per cent, at Duluth-Superior; and the remaining 41,992,151 bushels, or 7.3 per cent, came from the Lake Michigan ports of Green Bay, Manitowoc, Milwaukee, and Chicago.

Wheat was by far the most important grain shipped via the Great Lakes in 1928, constituting 72.2 per cent of the total grain movement. All four of the principal upper lake ports shipped wheat by water, but the amount coming from Fort William-Port Arthur comprised 75.3 per cent of the wheat and 54.4 per cent of all grain moving from ports on Lake Superior and Lake Michigan by water.

Barley, which ranked second in importance, was also shipped from each of the four upper lake ports, although about 95 per cent of the total barley movement originated at Fort William-Port Arthur and Duluth-Superior. The movement of barley on the lakes comprised about 12.2 per cent of the total grain movement in 1928.

Oats, comprising 6.4 per cent of the total movement of grain from upper lake ports, ranked third with shipments coming from Fort William-Port Arthur, Chicago, Milwaukee, Duluth-Superior, and Green Bay in the order of their importance as shipping points for this commodity.

Rye constituted 4.1 per cent of the total grain movement; corn, 3.4 per cent; and flax, 1.7 per cent. Shipments of rye came from Duluth-Superior, Fort William-Port Arthur, and Chicago in the order of their importance; Chicago was the most important shipping port for corn, followed by Milwaukee, and Manitowoc, with smaller shipments from Duluth-Superior and Green Bay; while flax came from Duluth-Superior and Fort William-Port Arthur only.

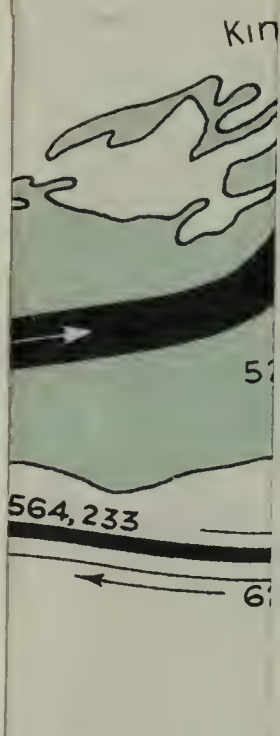
Shipments from lower lake and St. Lawrence River ports totaled 163,846,994 bushels. Of this total, however, 41.7 per cent originated at Buffalo and 56.8 per cent at Port Colborne, the greater proportion of the shipments from each of these ports consisting of grain transshipped to the smaller type vessel suitable for navigation on the Welland Canal and St. Lawrence River.

The charts also show the movement of grain via the Barge Canal. Table No. 89 gives details of the movement of the various kinds of grain on the canal to New York, including shipments via Oswego. There was also a movement of 230,688 bushels of grain from New York to Buffalo, which consisted of 62,867 bushels of wheat and 167,821 bushels of flaxseed; the wheat coming from Oregon via the Panama Canal, destined to up-State points requiring rail delivery.

RECEIPTS AT SEABOARD

RECEIPTS BY PORTS AND KINDS OF GRAIN

Tables Nos. 99 to 103, inclusive, show the receipts of each kind of grain at the several North Atlantic ports, including the St. Lawrence River ports, during the period 1920–1928, inclusive. Table No. 104 shows the total receipts of grain at these ports during the same period. The larger share of grain shown in these tables is ex-lake, but substantial quantities are received at the North Atlantic seaboard by rail from Chicago and interior western primary markets.



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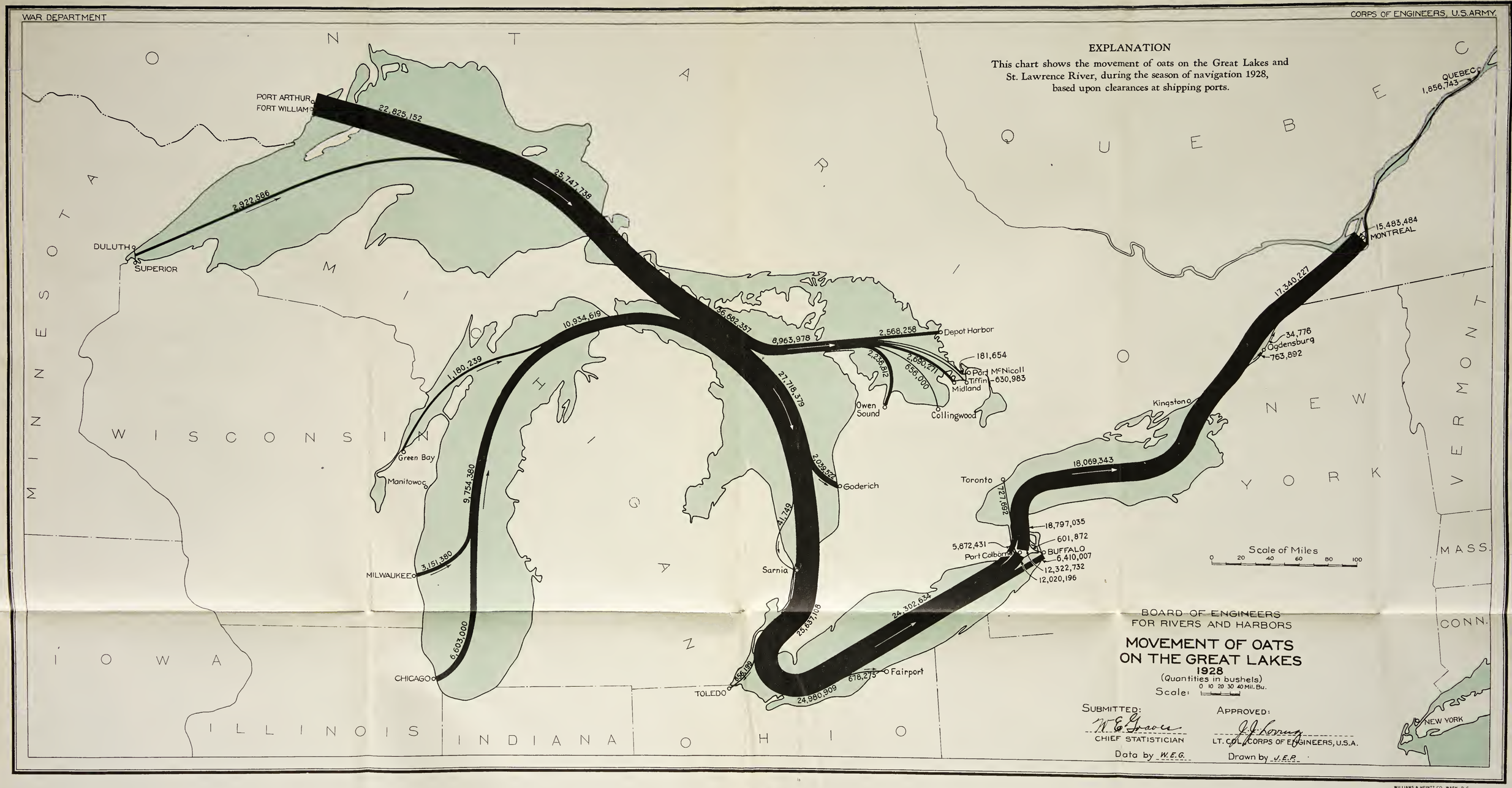

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF OATS ON THE GREAT LAKES 1928

(Quantities in bushels)

Scale: 0 10 20 30 40 Mil. Bu.

SUBMITTED: W. E. Graves
CHIEF STATISTICIAN

APPROVED: J. J. Loving
LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by W.E.G.

Drawn by J.E.P.

WILLIAMS & HEINTZ CO. WASH. D.C.

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WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.

EXPLANATION

This chart shows the movement of corn on the Great Lakes St. Lawrence River, and New York State Barge Canal during the season of navigation 1928, based upon clearances at shipping ports.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF CORN ON THE GREAT LAKES 1928

(Quantities in bushels)

Scale: 0 10 20 Mil. Bu

SUBMITTED:
W. E. Graves
CHIEF STATISTICIAN

APPROVED:
J. J. Loving
LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by W.E.G.

Drawn by E.L.G.

WILLIAMS & HEINTZ CO. WASH. D.C.

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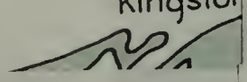

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CORPS OF ENGINEERS, U.S. ARMY

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF RYE ON THE GREAT LAKES 1928

(Quantities in bushels)

Scale: 0 10 20 30 Mil. Bu

SUBMITTED: W.E.Graves
CHIEF STATISTICIAN

APPROVED: J.J.Loving
LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by W.E.G.

Drawn by E.L.G.

WILLIAMS & HEINTZ CO. WASH. D.C.

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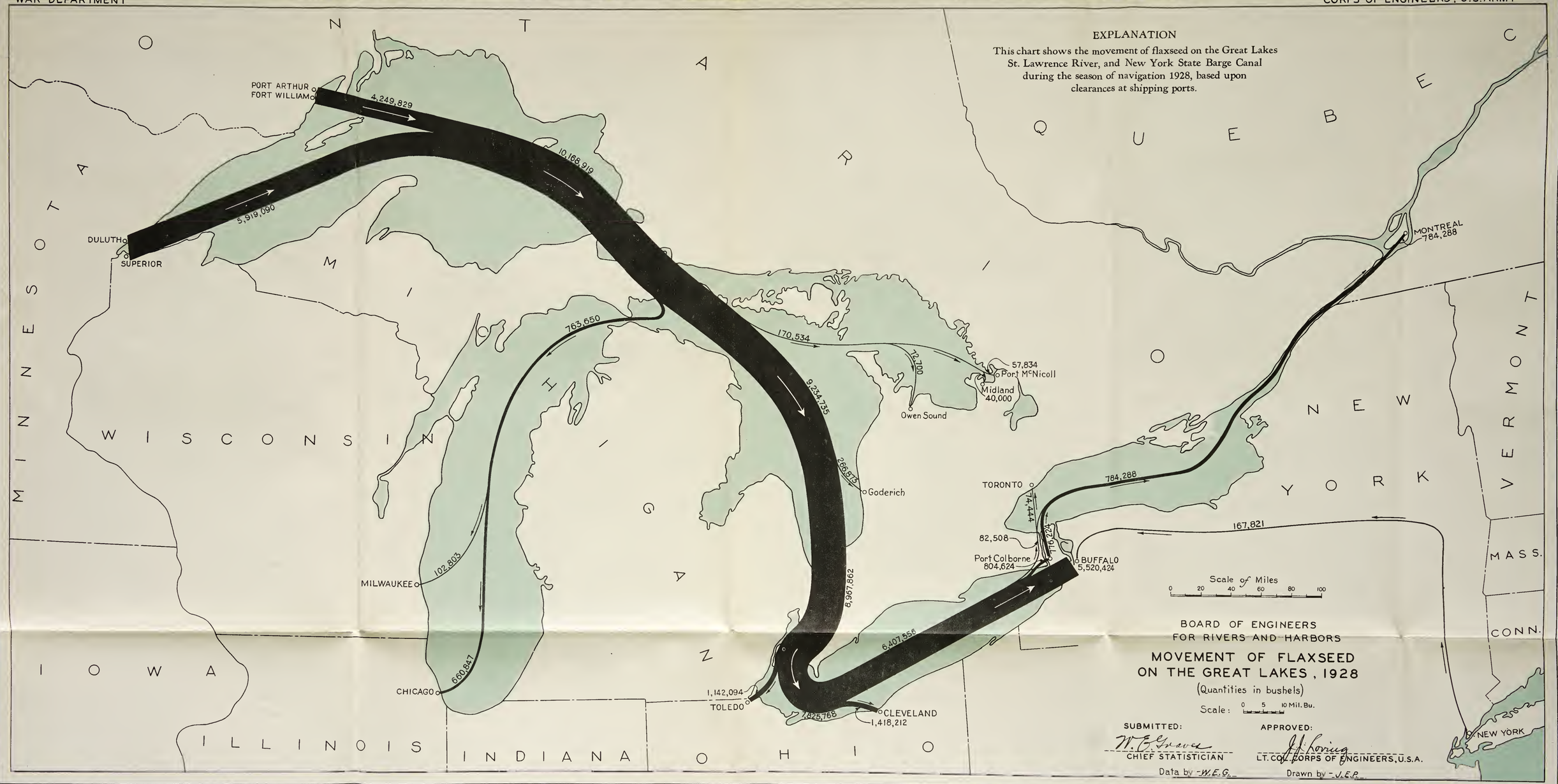
WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.ARMY



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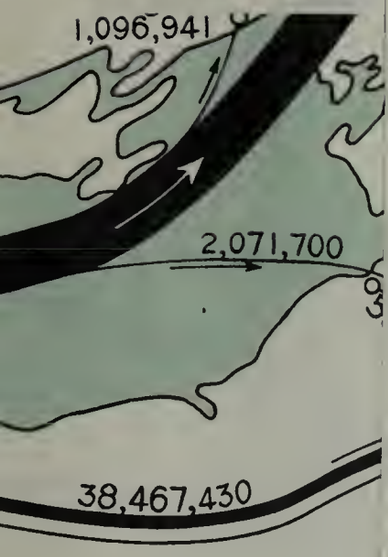

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TABLE NO. 99.—*Receipts of wheat at North Atlantic ports, 1920–1928, inclusive*

[Quantities in bushels]

Year	Montreal	Quebec	St. John	Halifax	Portland	Boston	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	45,554,675	113,779	10,690,586	(1)	13,541,362	4,852,550	62,573,335	22,204,344	33,544,501	2,153,278
1921	61,040,506	1,265,967	8,250,185	(1)	12,922,775	2,686,203	54,001,228	36,069,143	23,229,056	38,985
1922	91,621,859	2,009,206	6,762,388	(1)	13,071,348	6,947,748	68,968,566	49,347,174	23,762,973	----------
1923	99,811,766	3,180,936	12,481,401	(1)	14,697,971	8,818,044	77,289,517	34,357,749	21,331,569	1,074,084
1924	125,701,524	2,097,368	8,131,824	(1)	5,649,567	2,918,267	74,291,400	34,308,717	18,462,066	(1)
1925	82,835,106	2,953,822	4,046,798	80,178	4,604,633	2,107,433	78,026,900	34,589,128	15,852,999	(1)
1926	96,612,295	5,671,891	14,064,662	1,409,177	5,998,267	3,308,933	78,518,900	21,088,867	18,606,300	(1)
1927	127,279,357	6,851,130	20,106,738	548,288	3,078,767	2,505,733	72,758,970	21,278,060	21,817,233	(1)
1928	157,469,167	7,761,475	16,066,657	920,814	4,118,567	3,236,033	67,716,500	13,140,739	16,872,699	(1)
Average	98,658,473	3,556,175	11,177,915	328,717	8,631,473	4,153,438	70,460,591	29,598,213	21,497,711	(1)

[1] Data not available.

TABLE NO. 100.—*Receipts of oats at North Atlantic ports 1920–1928, inclusive*

[Quantities in bushels]

Year	Montreal	Quebec	St. John	Portland	Boston	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	7,219,733	271,788	386,342	839,001	2,024,350	14,731,900	3,335,796	3,816,077	89,885
1921	23,487,245	938,760	1,208,945	1,972,700	1,727,403	11,213,051	2,778,556	1,655,278	----------
1922	17,402,906	1,310,139	2,242,357	2,016,541	4,066,120	34,672,625	4,382,844	5,039,382	----------
1923	17,363,745	1,611,848	2,706,132	2,286,476	2,207,235	12,108,000	3,749,798	1,982,210	----------
1924	15,663,516	2,396,264	2,824,854	1,003,750	780,813	18,197,300	3,426,000	2,223,875	(1)
1925	44,365,567	1,813,253	1,575,579	367,813	1,128,188	23,483,300	8,042,000	2,117,375	(1)
1926	17,966,203	1,915,123	2,301,578	312,187	419,188	12,170,000	3,636,000	1,934,875	(1)
1927	8,163,418	4,003,219	52,557	104,688	39,188	7,446,000	1,908,000	990,250	(1)
1928	19,461,124	1,920,323	1,132,966	89,688	119,938	8,576,000	2,092,000	1,428,438	(1)
Average	19,010,384	1,797,857	1,603,479	999,205	1,390,269	15,844,242	3,705,666	2,354,196	(1)

[1] Data not available.

TABLE NO. 101.—*Receipts of corn at North Atlantic ports, 1920–1928, inclusive*

[Quantities in bushels]

Year	Montreal	Quebec	St. John	Portland	Boston	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	348,098	65,209	----------	725,870	115,385	6,764,896	2,133,148	5,310,433	109,466
1921	45,852,395	3,158,358	----------	569,435	1,406,279	13,229,736	11,770,807	22,168,762	446,133
1922	28,493,377	347,440	4,291,471	2,518,230	1,952,280	27,082,763	14,913,123	42,982,810	746,317
1923	2,412,657	346,601	658,356	305,186	186,598	9,348,500	6,342,734	9,152,694	184,467
1924	1,607,489	156,275	206,968	167,857	19,857	5,908,605	2,959,837	3,108,500	(1)
1925	473,907	83,396	----------	17,179	5,000	2,300,300	1,745,033	2,859,320	(1)
1926	977,621	260,909	77,637	90,607	45,036	2,452,159	1,383,787	1,881,571	(1)
1927	2,061,451	262,057	----------	3,250	----------	2,434,500	945,879	1,282,535	(1)
1928	483,448	186,080	99,131	33,964	2,465	2,963,900	2,663,029	2,795,964	(1)
Average	9,190,049	540,703	592,618	492,398	414,767	8,053,929	4,984,153	10,171,400	----------

[1] Data not available.

TABLE NO. 102.—*Receipts of barley at North Atlantic ports, 1920–1928, inclusive*

[Quantities in bushels]

Year	Montreal	Quebec	St. John	Portland	Boston	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	3,649,001	----------	848,708	1,262,868	127,130	5,409,307	129,968	1,251,328	150,414
1921	7,500,728	156,895	1,313,580	903,548	40,108	6,259,875	51,015	1,256,463	----------
1922	7,129,212	----------	911,638	1,364,756	127,945	7,314,668	139,496	993,175	----------
1923	8,256,806	10,350	909,615	1,698,269	108,470	6,770,700	166,945	275,256	1,263,712
1924	6,951,148	----------	1,197,376	908,167	257,042	20,055,700	862,600	3,664,833	(1)
1925	17,707,541	2,683	1,115,367	1,315,333	2,111,042	21,571,100	1,729,000	3,784,000	(1)
1926	17,236,455	206,763	130,315	488,167	1,405,500	16,436,600	1,058,300	4,145,083	(1)
1927	22,093,291	99,370	317,625	433,208	1,719,750	23,569,100	1,039,300	4,676,916	(1)
1928	29,284,883	661,541	1,393,131	280,667	2,334,000	18,289,392	2,198,300	9,993,958	(1)
Average	13,312,118	126,400	904,151	961,665	914,554	13,964,049	819,436	3,337,890	(1)

[1] Data not available.

TABLE NO. 103.—*Receipts of rye at North Atlantic ports, 1920–1928, inclusive*

[Quantities in bushels]

Year	Montreal	Quebec	St. John	Portland	Boston	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	2,376,868	----------	79,214	----------	866,630	24,719,214	2,546,091	20,933,270	311,487
1921	6,523,008	----------	60,835	----------	57,673	3,099,743	1,303,657	13,407,239	----------
1922	12,104,415	----------	344,042	----------	533,956	12,599,957	2,237,420	20,010,433	----------
1923	6,653,798	----------	1,770,121	----------	693,662	15,163,317	726,362	10,872,101	----------
1924	22,789,595	282,290	1,524,509	221,357	423,643	15,998,000	2,306,900	8,036,536	(1)
1925	13,294,686	34,328	1,447,590	58,107	1,139,178	5,031,100	1,082,900	4,527,000	(1)
1926	8,833,347	----------	420,980	65,250	----------	6,540,700	476,000	630,107	(1)
1927	34,082,729	177,993	1,908,353	12,357	192,500	5,518,000	448,800	770,750	(1)
1928	13,057,237	----------	2,325,476	----------	164,357	3,659,500	431,800	545,107	(1)
Average	13,301,743	54,957	1,097,902	39,675	452,400	10,592,170	1,284,437	8,859,171	(1)

[1] Data not available.

TABLE NO. 104.—*Receipts of grain at North Atlantic ports, 1920–1928, inclusive*

[Quantities in bushels]

Year	Montreal	Quebec	St. John	Portland	Boston	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	59,148,375	450,776	12,004,850	16,369,101	7,986,045	114,198,652	30,349,347	64,855,609	2,814,530
1921	144,403,882	5,519,980	10,833,545	16,368,458	5,917,666	87,803,633	51,973,178	61,716,798	485,118
1922	156,751,769	3,666,785	14,551,896	18,970,875	13,628,049	150,638,579	71,020,057	92,788,773	746,317
1923	134,498,772	5,149,735	18,525,625	18,987,902	12,014,009	120,680,034	45,343,588	43,613,930	2,522,263
1924	172,713,272	4,932,197	13,885,531	7,950,698	4,399,672	134,451,005	43,864,054	35,495,810	(1)
1925	158,676,807	4,887,482	8,185,334	6,363,065	6,490,841	130,412,700	47,188,061	29,140,694	(1)
1926	141,625,921	8,054,656	16,995,172	6,954,478	5,178,657	116,118,359	27,642,954	27,197,936	(1)
1927	193,680,246	11,393,769	22,385,273	3,632,270	4,457,171	111,726,570	25,620,039	29,537,684	(1)
1928	219,755,859	10,529,419	21,017,361	4,522,886	5,856,793	101,205,292	20,525,868	31,636,158	(1)
Average	153,472,767	6,064,997	15,376,065	11,124,415	7,325,550	118,581,647	40,391,905	46,220,368	----------

[1] Data not available.

RECEIPTS BY WATER AND RAIL

Table No. 105 shows the quantities of grain received by water and by rail separately at North Atlantic ports during the period 1920–1928.

TABLE NO. 105.—*Grain receipts at North Atlantic ports, by water and rail*

[Quantities in bushels]

BY WATER

Year	Montreal	Quebec	St. John	Portland	Boston
1920	14,943,748	73,133			
1921	64,524,051	[1] 1,579,432			
1922	86,311,398	1,291,811			
1923	88,503,761	[1] 4,963,063			
1924	115,678,146	3,807,050			
1925	125,737,376	4,499,577			
1926	107,561,517	7,534,636			
1927	157,381,881	8,255,857			1,822
1928	161,300,901	7,888,409			2,822
Average	102,438,087	4,432,541			516

BY RAIL

1920	44,204,627	377,643	12,004,850	16,369,101	7,986,045
1921	79,879,831	[1] 4,031,806	10,833,545	16,368,458	5,917,666
1922	70,440,371	2,374,974	14,551,896	18,970,875	13,628,049
1923	45,996,011	[1] 716,207	18,525,625	18,987,902	12,014,009
1924	57,035,126	1,125,147	13,885,531	7,950,698	4,399,622
1925	32,939,431	387,905	8,185,334	6,363,065	6,490,841
1926	34,064,404	520,050	16,995,172	6,954,478	5,178,657
1927	36,298,365	3,137,912	22,385,273	3,632,270	4,455,349
1928	58,454,958	2,645,010	21,017,361	4,522,886	5,853,971
Average	51,034,792	1,701,850	15,376,065	11,124,415	7,324,412

BY WATER—Continued

Year	New York	Philadelphia	Baltimore	Norfolk and Newport News
1920	9,667,502			
1921	12,190,183			
1922	18,471,279			
1923	21,217,834			
1924	25,117,405	163,954	1,360,797	[2]
1925	32,766,800	92,161	1,405,161	[2]
1926	28,936,259	102,154	2,126,894	[2]
1927	30,294,170	387,639	1,605,242	[2]
1928	39,138,092	180,268	1,580,826	[2]
Average	24,199,947	102,908	897,658	

BY RAIL—Continued

1920	104,531,150	30,349,347	64,855,609	2,814,530
1921	76,613,450	51,973,178	61,716,798	485,118
1922	132,167,300	71,020,057	92,788,773	746,317
1923	99,462,200	45,343,588	43,613,930	2,522,263
1924	109,333,600	43,700,100	34,135,003	[2]
1925	97,645,900	47,095,900	27,735,533	[2]
1926	87,182,100	27,540,800	25,071,041	[2]
1927	81,433,200	25,232,400	27,932,442	[2]
1928	62,067,200	20,345,600	30,055,340	[2]
Average	94,492,900	40,288,997	45,322,719	

[1] Includes flaxseed.

[2] Data not available.

MOVEMENT OF GRAIN THROUGH THE ST. LAWRENCE CANALS

The grain received at Montreal comes by small-type vessels operating through the Welland and St. Lawrence Canals, and also by rail chiefly from Georgian Bay ports and Goderich. The amounts of each kind of grain received by way of the St. Lawrence River are shown in Table No. 106. The enormous flow of grain from Fort William-Port Arthur in the year 1928 is again reflected in the amount of traffic through the St. Lawrence Canals in that year, making it the outstanding year of the period for the movement of grain. The average grain movement via the St. Lawrence River during the period 1920–1928 was 111,311,628 bushels.

TABLE No. 106.—*Movement of grain through St. Lawrence canals, 1920–1928*

[In bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Total
1920	11,773,866	1,117,794	83,928	1,906,375	98,000	14,979,973
1921	27,684,756	8,113,671	25,404,449	2,158,783	2,196,061	65,557,720
1922	58,031,500	7,325,817	13,173,628	4,018,426	4,662,833	87,212,204
1923	64,023,345	12,009,247	1,567,407	6,304,563	6,093,877	89,998,439
1924	99,796,733	12,563,750	1,650,571	3,346,750	8,278,714	125,636,518
1925	75,014,200	35,567,750	1,300,178	13,584,208	10,217,643	135,483,979
1926	78,368,933	19,779,500	2,029,893	15,585,333	7,432,750	123,196,409
1927	119,464,033	7,833,125	4,054,113	19,765,458	24,322,893	175,439,622
1928	127,897,366	18,749,306	2,243,000	24,893,916	10,516,200	184,299,788
Average	73,561,636	13,651,106	5,723,019	10,173,757	8,202,108	111,311,628

MOVEMENT OF GRAIN BY THE BARGE CANAL ROUTE

Table No. 107 shows the amounts of grain received at New York via the Barge Canal during each year between 1920 and 1928. The maximum for the period was in 1928, when 40,595,963 bushels were shipped down the canal. The average receipts during the period were 23,606,291 bushels.

TABLE No. 107.—*Grain received at New York via the Barge Canal, 1920–1928*

[Quantities in bushels]

Year	Wheat	Oats	Corn	Barley	Rye	Total
1920	2,005,635	76,100	----------	451,257	1,244,814	3,777,806
1921	7,315,728	2,037,051	1,565,136	1,182,875	89,393	12,190,183
1922	11,168,766	946,625	2,506,163	1,193,368	2,654,357	18,469,279
1923	10,047,917	343,000	1,609,300	1,524,500	7,693,117	21,217,834
1924 [1]	13,761,333	1,085,751	1,238,072	2,651,158	6,204,000	24,940,322
1925	18,277,200	2,295,250	647,607	9,733,125	1,557,500	32,511,182
1926	16,677,067	1,315,500	308,750	8,842,833	2,405,143	29,549,293
1927	19,014,100	805,000	253,000	7,744,083	1,388,571	29,204,754
1928	33,451,266	----------	66,679	5,828,625	1,246,393	40,595,963
Average	14,635,446	989,364	910,523	4,350,203	2,720,365	23,606,291

[1] Figures represent eastbound movement from Buffalo and Oswego.

Out of the grand total of 702,218 tons of grain moved, 24,120 net tons from Buffalo were destined to local canal points.

EXPORTS BY NATIONALITY OF GRAIN

Table No. 108 shows the exports of grain from the principal North Atlantic ports, segregated according to United States and Canadian grain.

TABLE NO. 108.—*Grain exports from St. Lawrence River and Atlantic seaboard ports, 1920–1928, by nationality of grain*

[Quantities in bushels]

UNITED STATES GRAIN

Year	Montreal [1]	Quebec [1]	St. John [1]	Portland [2]	Boston [2]	New York	Philadelphia	Baltimore	Hampton Roads Ports [3]
1920	12,300,778	----------	79,214	1,710,715	4,698,098	74,123,045	21,024,698	51,721,881	2,814,530
1921	38,241,157	82,092	1,828,791	1,406,881	1,926,065	45,632,400	26,398,237	48,775,343	485,118
1922	81,507,094	3,243,782	4,822,353	3,752,078	4,781,313	76,268,228	34,175,741	75,692,573	746,317
1923	52,378,774	351,581	2,582,880	690,689	465,182	29,424,896	14,183,670	24,804,522	2,522,263
1924	66,146,744	1,265,831	1,499,703	208,640	184,800	38,162,789	14,003,383	11,964,915	1,882,567
1925	41,069,098	164,094	3,376,695	19,240	324,500	28,897,100	18,073,350	18,756,773	388,406
1926	34,343,479	109,724	4,134,595	94,160	258,850	23,690,904	6,832,016	11,089,886	460,619
1927	91,813,053	561,739	6,976,649	115,880	229,900	18,372,070	6,106,688	11,525,361	1,804,605
1928	56,700,566	33,343	11,098,172	213,520	130,820	15,188,655	3,304,569	7,555,722	3,469,556
Average	52,722,305	645,798	4,044,339	912,423	1,444,392	38,862,232	16,011,362	29,098,553	1,691,331

CANADIAN GRAIN

1920	34,322,997	464,994	12,170,866	16,424,898	751,143	13,664,213	3,440,055	2,367,886	----------
1921	52,041,230	41,167	9,086,523	17,202,709	3,161,552	39,066,181	20,371,049	6,539,465	----------
1922	51,819,704	784,012	9,731,871	16,203,065	8,450,154	45,201,506	28,123,905	14,136,452	----------
1923	82,359,088	2,858,275	15,915,245	19,048,819	10,176,013	74,826,441	22,211,034	17,162,665	1,414,857
1924	85,925,266	1,239,790	13,344,097	8,343,920	3,511,200	67,575,211	20,824,317	13,213,067	2,985,520
1925	105,142,312	2,244,943	9,705,179	7,064,520	6,165,500	91,656,830	23,527,675	12,272,847	330,528
1926	91,699,246	5,712,406	15,759,189	8,243,960	4,918,850	79,159,096	16,965,919	13,550,606	669,500
1927	92,032,823	6,786,597	17,369,132	4,978,560	2,235,100	81,446,930	13,045,930	12,278,107	779,290
1928	138,228,318	8,220,356	11,151,216	3,454,040	6,410,180	72,709,349	10,322,018	11,306,615	585,105
Average	81,507,887	3,150,282	12,692,591	11,218,277	5,086,633	62,811,751	17,647,989	11,427,412	751,644

[1] Crop years 1920–1923, inclusive.
[2] Figures for 1924–1928, inclusive, are estimates only, no exact segregation of American and Canadian grain being available.
[3] Figures for 1920–1923, inclusive, cover Newport News only.

FREIGHT RATES AND TERMINAL CHARGES

RATES TO PRIMARY MARKETS AND UPPER LAKE PORTS

Minneapolis and Duluth-Superior.—The accompanying tables show rates from representative producing points to interior primary markets and lake ports. A large amount of grain from Minnesota and the Dakotas moves to Minneapolis, from which point a proportional rate of 6.5 cents per 100 pounds applies on wheat moving to Duluth. The proportional rate on both wheat and coarse grain in carloads from Minneapolis to Duluth was formerly 5 cents per 100 pounds, which rate was increased on June 25, 1918, to 6½ cents per 100 pounds. In December, 1919, the Interstate Commerce Commission, in Ex parte 70, prescribed a rate of 5½ cents per 100 pounds which remained effective until August, 1920, when it was increased to 7½ cents per 100 pounds. On July 1, 1922, it was reduced to the present rate of 6½ cents per 100 pounds on wheat, and 6 cents on coarse grains. The territory of origin in connection with the foregoing proportional rate is largely North and South Dakota, Minnesota, and Montana. The following table indicates in a limited way the territory affected:

TABLE NO. 109.—*Rates on grain, carloads*

[In effect Oct. 19, 1929. Rates are stated in cents per 100 pounds]

From—	To—			
	Minneapolis, St. Paul, Minn., transfer		Duluth, Minn., and Superior, Wis.	
	Wheat	Corn, oats, rye, barley	Wheat	Corn, oats, rye, barley
Starbuck, Minn	13.5	12	14	12.5
Litchfield, Minn	9.5	8.5	15.5	14
Salem, S. Dak	20	18	26.5	24
Morris, Minn	13	11.5	16.5	15
Little Falls, Minn	12	11	13	11.5
Brainerd, Minn	12.5	11.5	12.5	11.5
Red Lake Falls, Minn	16	14.5	16	14.5
Manitoba Junction, Minn	14.5	13	14.5	13
Grand Forks, N. Dak	16.5	15	16.5	15
Stillwater, Minn	6.5	6	13	11.5
St. Cloud, Minn	9.5	8.5	13.5	12
Crookston, Minn	16	14.5	16	14.5
Moorhead, Minn	14.5	13	15.5	14
Fergus Falls, Minn	13.5	12	14	12.5
Carthage Junction, Minn	16.5	15	16.5	15
Breckenridge, Minn	14	12.5	14.5	13
Wahpeton, N. Dak	15.5	14	17	15.5
Edgeley, N. Dak	21	19	21	19
Bismark, N. Dak	23.5	21	23.5	21
Wadena, Minn	13	11.5	13	11.5
Bemidji, Minn	15.5	14	15.5	14
Appleton, Minn	13	11.5	17.5	16
Sauk Center, Minn	12	11	13.5	12
Pipestone, Minn	14	12.5	19	17
Minot, N. Dak	23.5	21	23.5	21
Fargo, N. Dak	16.5	15	16.5	15
Leeds, N. Dak	20.5	18.5	20.5	18.5
Sioux Falls, S. Dak	18.5	16.5	24	21.5
Aberdeen, S. Dak	21	19	24	21.5
Watertown, S. Dak	18	16	23	20.5

Tariff authorities: Northern Pacific I. C. C. 8353; Great Northern I. C. C. A–6413.

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Throughout the territory covered by Table No. 109 Duluth enjoys an advantage over Chicago, and this advantage extends westward to the extreme limit of the direct influence of the lake route, which embraces a large part of the State of Montana.

This territory is highly competitive and has been in the past, and still continues to be, a constant source of rate litigation. In recent years the Interstate Commerce Commission has expressed its opinion in more than 12 important cases involving rates in this general territory. So far as Minneapolis, Duluth, and Chicago are concerned, the rate structure in this territory is complicated and involves many factors not present in other territories.

Table No. 110 shows rates to Duluth and Chicago from points in Montana and Idaho. It will be seen that throughout this territory the advantage is in favor of Duluth-Superior. The rates per 100 pounds to Duluth covered by this table range from a minimum of 30 cents to a maximum of 59.5 cents, while those on wheat to Chicago range from a minimum of 43 cents to a maximum of 72.5 cents. The influence of the lake route now entends approximately to Columbia Falls, Mont., from which point the rate to Duluth-Superior is 48 cents per 100 pounds, equivalent to 28.8 cents per bushel. Elsewhere in this report it is shown that a large amount of wheat moves from Montana to Duluth-Superior. This is subject to an expense of 18 to 28.8 cents per bushel in order to reach the nearest lake port.

Fort William-Port Arthur.—The Canadian producer of spring wheat has an important transportation advantage over his American competitor directly across the boundary line, due to the lower rates in effect to Fort William-Port Arthur as compared with Duluth. Table No. 112 shows rates from a few representative points in the Canadian Provinces. As illustrative of the advantage of the Canadian shipper, the rate from Calgary to Fort William of 26 cents per 100 pounds, or 15.6 cents per bushel, for a haul of 1,251 miles, should be compared with the rate of 48 cents per 100 pounds, or 28.8 cents per bushel, from Columbia Falls to Duluth, a distance of 1,185 miles. It will be seen that the Canadian farmer has an advantage of 13.2 cents per bushel, and this advantage affects not only the grain which is actually forwarded by way of the Great Lakes for export, but also grain which is consumed in domestic markets. Substantial advantages will be found to exist in rates from all shipping points in the Canadian Provinces as compared with rates from points in the Northwestern States equidistant from the Great Lakes.

Milwaukee and Chicago.—The territory served by Milwaukee on a more favorable basis than other ports is limited to a more or less local district. Table No. 113 shows rates to Milwaukee and Chicago from representative points. From all points in Wisconsin except Racine and Beloit, Milwaukee has an advantage.

The territories served by Chicago extend all the way from South Dakota to Oklahoma. Throughout some of this area it competes with other important primary markets, but its supremacy as the principal grain market of the country has not been seriously threatened in recent years. Prior to June 25, 1918, the proportional rate on grain in carloads from Minneapolis to Chicago was 10 cents per 100 pounds on wheat, and 7½ cents on coarse grain. On June 25, 1918, the rates on both wheat and coarse grains were increased to 12½ cents per 100 pounds. This rate remained in effect until December 18, 1919, on which date the Interstate Commerce Commission prescribed a rate of 11 cents per 100 pounds in Ex parte 70. The rate of 14½ cents per 100 pounds was established in August, 1920, under Ex parte 74, and in July, 1922, reduced to the present rate of 13 cents per 100 pounds.

Tables Nos. 110–116, inclusive, show the rates on grain from numerous shipping points to Chicago and competing gateways.

TABLE NO. 110.—*Rates on grain—carloads*

[In effect Oct. 19, 1929. Rates are stated in cents per 100 pounds]

From—	To—		
	Duluth, Minn., and Superior, Wis.	Chicago, Ill.	
	Wheat, corn, oats, rye, barley	Wheat	Corn, oats, rye, etc.
Anaconda, Mont	45.5	38.5	57
Snowden, Mont	30	43	41.5
Havre, Mont	39.5	52.5	51
Teton, Mont	42	55	53.5
Vandalia, Mont	36	49	47.5
Frazer, Mont	34	47	45.5
Wagner, Mont	37.5	50.5	49
Pendroy, Mont	45.5	58.5	57
Columbia Falls, Mont	48	61	59.5
Bonners Ferry, Idaho	59.5	72.5	66.5
Naples, Idaho			
Elmira, Idaho			
Sand Point, Idaho			

Tariff authority: Great Northern Railway, I. C. C. A–6420.

TABLE No. 111.—*Proportional rates on grain—carloads*

[In effect Oct. 19, 1929. Rates are stated in cents per 100 pounds]

From—	To—					
	Chicago, Ill.		Duluth, Minn.		St. Paul and Minneapolis, Minn.	
	Wheat	Rye barley, corn, oats	Wheat	Corn, oats, rye, and barley	Wheat	Corn, oats, rye, and barley
Minneapolis, Minn	13	11.5	6½	6		
Kansas City, Mo	17.5	16	19	19	17.5	16
Kansas City, Kans	17.5	16				
Omaha, Nebr	17.5	16	17.5	16	16.5	15
Council Bluffs, Iowa	17.5	16	17.5	16	16.5	15
Des Moines, Iowa	17.5	16				
Atchison, Kans	17.5	16	19	19	17.5	16
Leavenworth, Kans	17.5	16	19	19	17.5	16
St. Joseph, Mo	17.5	16	19	19	17.5	16
Sioux City, Iowa	17.5	16	17.5	16	16.5	15
Nebraska City, Nebr	17.5	16	19	19	16.5	15
Peoria, Ill	6.5					
Duluth, Minn	13	11.5				

Tariff authorities: Minneapolis & St. Louis R. R., I. C. C. B-613, Great Northern Ry., I. C. C. A-6188, Soo Line, I. C. C. 6256, and Chicago, Burlington & Quincy R. R., I. C. C. 17154.

TABLE No. 112.—*Rates on grain—wheat, barley, corn, oats, and rye in carloads, to Port Arthur, Armstrong, Fort William, and Westfort, Canada*

[In effect Oct. 19, 1929]

From—	Rate (in cents per 100 pounds)	From—	Rate (in cents per 100 pounds)
Edmonton, Alberta	26	Dauphin, Manitoba	18
Calgary, Alberta	26	Russell, Manitoba	18
Prince Albert, Saskatchewan	23	Brandon, Manitoba	16
Battleford, Saskatchewan	24	Emerson, Manitoba	15
Saskatoon, Saskatchewan	22	Portage le Prairie, Manitoba	15
Regina, Saskatchewan	20	Winnipeg, Manitoba	14
Gypsumville, Manitoba	18		

Tariff authority: Canadian National Railways, I. C. C. W-265 and effective supplements.

TABLE NO. 113.—*Rates on grain, carloads, to Chicago, Ill., and Milwaukee, Wis.*

[In effect Oct. 19, 1929. Rates are stated in cents per 100 pounds]

From—	To—			
	Chicago, Ill.		Milwaukee, Wis.	
	Wheat	Corn, oats, rye, barley	Wheat	Corn, oats, rye, barley
Rock Island, Ill	13	13	13	13
Davenport, Iowa	13	13	13	13
Muscatine, Iowa	14	14	14	14
Burlington, Iowa	[1] 14	[1] 14	[1] 14	[1] 14
Cedar Rapids, Iowa	19.5	17.5	19.5	17.5
Waterloo, Iowa	19.5	17.5	19.5	17.5
Cedar Falls, Iowa	19.5	17.5	19.5	17.5
Mason City, Iowa	22.5	20.5	22.5	20.5
Iowa Falls, Iowa	20.5	18.5	20.5	18.5
Ottumwa, Iowa	20.5	18.5	20.5	18.5
Des Moines, Iowa	20.5	18.5	20.5	18.5
Fort Dodge, Iowa	21	19	21	19
Dubuque, Iowa	14.5	14.5	14.5	14.5
Iowa City, Iowa	18	16	18	16
Bettendorf, Iowa	13	13	13	13
Clinton, Iowa	17.5	16	17.5	16
Keokuk, Iowa	[1] 14	[1] 14	[1] 14	[1] 14
Middletown, Iowa	17	15.5	17	15.5
Dekalb, Iowa	21.5	19.5	21.5	19.5
Batavia, Iowa	19.5	17.5	19.5	17.5
Boone, Iowa	20.5	18.5	20.5	18.5
Cromwell, Iowa	23	20.5	23	20.5
Mound City, Mo	23.5	21.5	23.5	21.5
Mendota, Mo	20.5	18.5	20.5	18.5
Savannah, Mo	23.5	21.5	23.5	21.5
Council Bluffs, Iowa	23.5	21.5	23.5	21.5
Kansas City, Mo	23.5	21.5	23.5	21.5
Racine, Wis	5	5	5	4.5
Eden, Wis	14	12.5	11	10
Fox River, Wis	12	12	10	10
Little Rapids, Wis	18	16	14	12.5
Green Bay, Wis	18	16	14	12.5
Wisconsin Rapids, Wis	18	16	14.5	13
Beloit, Wis	12.5	12.5	12.5	12.5
Madison, Wis	16	15	12	11
La Crosse, Wis	18	16	14.5	13
Fond du Lac, Wis	15.5	14	11	10

[1] Rate applies on shipments moving east via Lake routes.

Tariff authorities: Chicago, Rock Island & Pacific R. R., I. C. C. 11734; Chicago, Burlington & Quincy R. R., I. C. C. 17219 and 17154; and Chicago & Northwestern R. R., I. C. C. 9422.

The proportional rate applying on traffic originating in or destined to points in Carolina and southeastern territories from Brookport, Cairo, Joppa, Metropolis, Mounds, and Thebes, Ill., Evansville, Jeffersonville, New Albany, Ind., and from Cincinnati, Ohio, to Chicago is 19 cents per 100 pounds and to Milwaukee 22.5 cents. Tariff authority: Agent B. T. Jones, I. C. C. 2100.

TABLE NO. 114.—*Rates on grain in carloads to Chicago, Ill.*

[In effect Oct. 20, 1929. All rates are stated in cents per 100 pounds]

From—	Wheat	Corn, oats, rye, barley	From—	Wheat	Corn, oats, rye, barley
Rockford, Ill	11.5	11.5	Aurora, Ill	8	8
Vanland, Ill	11.5	11.5	Joliet, Ill	8	8
DeKalb, Ill	9	9	Delmar, Ill	8	8
Duffin, Ill	9	9			

These rates include no terminal charges. Except as otherwise provided in tariff, rates apply to deliveries within the Chicago switching district. The authority is Chicago, Milwaukee & Gary Ry., I. C. C. C-197.

From—	Wheat and corn	From—	Wheat and corn
Cairo, Ill	12.5	Brookport, Ill	12.5
Mounds, Ill	12.5	Mason City, Ill	11.5
Evansville, Ind	11.5	Madison, Ill	11.5
Paducah, Ky	16.0	E. St. Louis, Ill	11.5
Metropolis, Ill	12.5	St. Louis, Mo	11.5

The foregoing rates apply on wheat and corn and only when forwarded from Chicago via Lakes Line to Cleveland, Toledo, Buffalo, and points east thereof, and only on grain passing through elevators on tracks of the Illinois Central R. R. Rates are subject to all terminal charges published by the carriers. Tariff authority Illinois Central R. R., I. C. C. A-10179.

Rates on wheat, corn, oats, rye, and barley in carloads to Chicago, Ill., and points in Chicago switching district

From—	Rate	From—	Rate
Terre Haute, Ind	[1] 14.5	Bedford, Ind	19
Westport, Ind	19	Humrick, Ind	[1] 12.5

[1] On grain originating at stations on the Chicago, Milwaukee & St. Paul (Terre Haute Division) which has paid the local rate into Chicago, if the original paid freight bills are surrendered showing that the grain has been forwarded from Chicago via lake, lake and rail, or from Chicago via Milwaukee and Car Ferry routes, the Chicago, Milwaukee & St. Paul Ry. will adjust the charges into Chicago to a basis of 9 cents per 100 pounds. Tariff authority: Chicago, Milwaukee & St. Paul and Pacific Ry., I. C. C. B-5554.

TABLE NO. 115.—*Rates on grain in carloads*

[In effect Oct. 20, 1929. Rates are stated in cents per 100 pounds]

From—	To—			
	Chicago, Ill.		St. Louis, Mo.	
	Wheat and wheat flour	Corn, oats, etc.	Wheat and wheat flour	Corn, oats, etc.
Sulphur Springs, Ark	33.5	30	29.5	26.5
Gentry, Ark	33.5	30	29.5	26.5
Siloam Springs, Ark	34.5	31.5	30.5	27.5
Fort Smith, Ark	37	33.5	33	29.5
Potter, Ark	41.5	37.5	39.5	35.5
De Queen, Ark	41.5	37.5	39.5	35.5
Wiggins, Colo	50.5	45.5	46.5	41.5
Sioux City, Iowa			[1] 17.5	[1] 16
Concordia, Kans	35	32	31	28
Oberlin, Kans	38	34.5	34	30.5
St. Francis, Kans	39	35.5	35	31.5
Wichita, Kans	35.5	32	31.5	28
Hutchinson, Kans	36.5	33	32.5	29
Fuller, Kans	29.5	27	25.5	23
Lawton, Kans	29.5	27	25.5	23
Kansas City, Mo			[1] 13.5	[1] 12
Independence, Mo	23.5	21.5	19.5	17.5
Drexel, Mo	28	25	20.5	18.5
Oskaloosa, Mo	28	25	20.5	18.5

[1] Proportional rate.

TABLE No. 115.—*Rates on grain in carloads*—Continued

[In effect Oct. 20, 1929. Rates are stated in cents per 100 pounds]

From—	To—			
	Chicago, Ill.		St. Louis, Mo.	
	Wheat and wheat flour	Corn, oats, etc.	Wheat and wheat flour	Corn, oats, etc.
Asbury, Mo	29.5	27	23	20.5
Joplin, Mo	29.5	27	23	20.5
Goodman, Mo	29.5	27	24	21.5
Ralston, Nebr	23.5	21.5	[2] 19.5	[2] 17.5
La Platte, Nebr	23.5	21.5	[2] 19.5	[2] 17.5
South Bend, Nebr	25.5	23	[2] 21.5	[2] 19
Lincoln, Nebr	28.5	26	[2] 24.5	[2] 22
Hastings, Nebr	37	33.5	33	29.5
Kearney, Nebr	37	33.5	33	29.5
Imperial, Nebr	39	35.5	35	31.5
Fremont, Nebr	27	24.5	23	20.5
Alliance, Nebr	43	39	39	35
Culbertson, Nebr	39	35.5	35	31.5
Grand Island, Nebr	37	33.5	33	29.5
Bradshaw, Nebr	34.5	31.5	30.5	27.5
O'Neil, Nebr	36.5	33	34	30.5
Greeley Center, Nebr	37	33.5	33	29.5
Superior, Nebr	37	33.5	33	29.5
Cherokee, Okla	38	34.5	34	30.5
Fairview, Okla	40	36.5	36	32.5
Clinton, Okla	41.5	38	37.5	34
Cheyenne, Okla	43.5	39.5	39	35
Guthrie, Okla	40	36.5	36	32.5
Ardmore, Okla	44.5	40.5	40.5	36.5
Enid, Okla	38.5	35	34.5	31
Durant, Okla	44.5	40.5	40.5	36.5
Apache, Okla	41	37.5	37	33.5
Comanche, Okla	43	39	39	35
Texola, Okla	48.5	44	44.5	40
Altus, Okla	43	39	39	35
Frederick, Okla	43	39	39	35
Mangum, Okla	43	39	39	35
Randolph, Okla	44.5	40.5	40.	36.5
Gans, Okla	34.5	31.5	30.5	27.5
Spiro, Okla	34.5	31.5	30.5	27.5
Braden, Okla	37	33.5	33	29.5
Page, Okla	40.5	37	36.5	33
Clearview, Okla	38.5	35	34.5	31

[2] St. Louis rates apply on traffic destined to points east of Illinois-Indiana State line.

The above rates include no terminal charges.

Tariff authorities: Kansas City, Mexico & Orient R. R., I. C. C. 386; Chicago, Rock Island & Pacific Ry., I. C. C. C-11520; Chicago, Burlington & Quincy, I. C. C. 17330; Wabash Ry., I. C. C. 6328; and Missouri Pacific R. R., I. C. C. A-7429; Kansas City Southern Ry., I. C. C. 4458.

TABLE No. 116.—*Rates on grain in carloads to Kansas City, Mo.*

[In effect Oct. 21, 1929. Rates are stated in cents per 100 pounds]

From—	Wheat	Corn	From—	Wheat	Corn
Ellsworth, Kans	19	17	Spring Hill, Kans	9.5	8.5
Columbus, Kans	13.5	12	Paola, Kans	9.5	8.5
Fredonia, Kans	14.5	13	Fort Scott, Kans	12	11
Ashley, Kans	16	14.5	Cherokee, Kans	13.5	12
Severy, Kans	18	16	Parsons, Kans	13.5	12
Lorraine, Kans	19	17	Hutchinson, Kans	19	17
Wichita, Kans	18	16	McPherson, Kans	19	17
Arkansas City, Kans	18	16	Stafford, Kans	19.5	17.5
Galena, Kans	13.5	12	Lawrence, Kans	9	8
Empire, Kans	15.5	14			

Tariff authorities: St. Louis-San Francisco, I. C. C. 8882; Atchison, Topeka & Santa Fe Ry., I. C. C. 10056; Missouri Pacific, I. C. C. a-6261.

Proportional rates on wheat and corn, in carloads, to Kansas City, Mo.

[In effect Oct. 21, 1929. Rates are stated in cents per 100 pounds]

From—	Wheat	Corn	From—	Wheat	Corn
Higginsville, Mo	7.5	7	Louisiana, Mo	9	8
Fulton, Mo	9	8	Marshall, Mo	9	8
Glasgow, Mo	9	8	Slater, Mo	9	8
Mexico, Mo	9	8			

The above are proportional rates to apply on shipments consigned through to points in Arkansas, Missouri, and Oklahoma. They include no terminal charges. The authority is Chicago & Alton, I. C. C. A-1900.

LAKE RATES

Unlike rail rates, which are maintained on a stable basis through the regulation of the Interstate Commerce and the State railroad commissions, the rates by water on the Great Lakes vary in accordance with the demand for space, which in itself is a reflection of constantly changing commercial and economic conditions. In general, rates on the Lakes ascend when there is an abundance of cargo seeking space, and they decline to low levels when the offerings are small and there is a surplus of vessel tonnage available. The seasonal nature of the grain crop and the difference between the periods of the movement of Canadian and American spring wheat and American winter wheat in themselves make the demand for vessel space for grain irregular. If the movement of ore upon the Great Lakes should happen to be large during the period when vessel tonnage is needed to move grain, grain rates naturally ascend. Lake rates are also influenced by conditions affecting the turn around of the bulk lake carriers. The normal time required for a round trip from Duluth-Superior or Port Arthur-Fort William to Lake Erie ports is seven to eight days, including all time required at ports for loading and unloading. When congestion begins to be felt at the lower lake elevators, as it does every fall, the turn around of the vessel is increased and the rates necessarily advance. This is also true of rates by way of the smaller-type vessels operating from Port Colborne and Buffalo to Montreal. Congestion at the latter port has an immediate effect on the rates via these vessels. On account of the various factors affecting lake rates on grain throughout the season, it is not practicable to present a table showing these rates for a period of years which would permit reliable comparisons to be made. Cases are quite frequent where rates on different lots of grain in the same vessel vary within a wide range. The following statement from the annual report of the Lake Carriers' Association gives an excellent idea of the rate situation during 1928:

"As accurately as can be ascertained from daily records kept on grain chartering, the average rates on grain for immediate delivery were as follows:

"Lake Superior to Lake Erie, 3½ cents per bushel.

"Lake Michigan to Lake Erie, 3 cents per bushel.

"Lake Superior and Lake Michigan to Georgian Bay, 3 cents per bushel.

"The average for the season, wheat basis, from all shipping ports on grain to unload figures out at 3¼ cents per bushel, as compared with an average of 2.12 cents per bushel in 1927. It may be added that while the average rate paid for grain shipments over the short voyage to Georgian Bay was uncommonly high, and brought about by the fancy prices paid in the fall, the maximum rate having equalled storage rates of 6¼ cents, the trade was not so remunerative to the vessels as the figure would indicate for the reason that congestion in the Georgian Bay elevators caused delays of a week's duration.

"The average rate on winter storage grain was 6⅖ cents per bushel.

"The season's initial charters for first sailing were made at 3½ and 3 cents and these rates maintained steadily throughout the spring, notwithstanding that a lack of export demand put even the Canadian grain carriers on the waiting list at the head of the Lakes. In July there was some chartering at 1¾ cents per bushel. The export demand quickened in midsummer and in August vast quantities of grain were put into charter for future loading: For the first half of September 2¼ cents was paid; for the last half of September 2½ cents; for the first and last halves of October, 2¾ and 3 cents, respectively. On September 21 the rate for prompt loading on Lake Superior rose to 3 cents. By the end of the month the rate was 3¾ cents and on October 4 the rate was 4 cents with vessels scarce at that figure. Rates were easy from the middle to the end of October and on November 2 the chartering rate fell to an autumn low of 3 cents per bushel for wheat from Lake Superior to Buffalo. From November 17 on there ensued a period of sharp advances. From a prevailing rate of 3¼ cents the price was raised on November 20 to 4½ cents to Buffalo and 4 cents to Georgian Bay, both with dispatch guaranty. On November 21 Duluth was paying 4¾ cents and Fort William 5 cents for prompt loading. On November 23 another sharp advance brought the rate to Buffalo up to 5¾ cents, with 5 cents paid to Georgian Bay, and on November 24 an advance to 6 cents a bushel brought the rate to load by midnight November 30 up to parity with winter storage prices.

"Increased insurance necessitated higher rates for December movement. For sailings by midnight December 5 the rate from Lake Superior to Buffalo was 6 cents and to Georgian Bay 6¼ cents. On December 6 the rate went to 6½ cents, on December 7 to 6¾, and on December 7 charters were made at 7 cents per bushel to sail by midnight December 9, and this price again equaled the current winter storage rate. Contrary to the trade in previous years there were not many ships to sail from Lake Superior during the period De-

cember 5–9 with grain to unload, while in the period December 9–12 the clearances were practically all winter storage cargoes.

"During the fall period of navigation some grain was shipped from Duluth to South Chicago at 4 and 4½ cents per bushel.

"The 1928 average grain rate of 3¼ cents per bushel compares with an average of 2.12 cents in 1927; 3.38 cents in 1926 and 2.28 cents in 1925."

STORAGE GRAIN

"The season's business on winter storage grain was not marked by the violent price fluctuations that so frequently characterized the trade in previous years. The first storage charter was closed on July 21 and called for 5½ cents to load in October. During August and early September the storage rate ranged from 6 to 7 cents. On September 21 the rate was advanced to 7¼ cents; on September 28 the ratewas 7¾ cents, while on October 17 the season's peak price of 8½ cents was paid on wheat to load immediately and hold at Buffalo. During November and early December the storage rate to hold at Buffalo was firm at 7 cents. The final charter for Lake Erie storage was closed on December 10 and called for 8 cents to load at Fort William and hold at Port Colborne.

"During the season some more nominal charters were made to hold grain on Lake Huron and at Lake Erie side ports. Cargoes to hold at Toledo and Fairport were made at 4½ cents; at both Sarnia and Goderich at 5½ cents. There were periods, however, when the storage rate to Toledo stood at 6 cents, to Sarnia 7 cents, and Erie 7 cents.

"Eliminating from the season's calculation the differential chartering rates for holding grain at Lake Erie side ports, it is found that the average winter storage rate for Buffalo and Port Colborne was 6⁷⁄₁₀ cents per bushel. Winter storage grain for delivery next spring is being held at Fort William at 6½, 7, and 7½ cents per bushel and at Duluth at 6 and 6½ cents per bushel.

"The average winter storage rate of 6⅗ cents per bushel for the season of 1928 compares with an average of 5⅗ cents in 1927; 5.7 cents in 1926; 5.45 cents in 1925; 5.29 cents in 1924; and 6.37 cents in 1923."

ST. LAWRENCE RIVER RATES

Rates on the small carriers operating between Port Colborne, Buffalo, and Montreal are subject to the same influences as the rates on the Great Lakes. Roughly speaking the rate to Montreal via these small carriers is approximately twice the rate of the large lake carrier, while the haul is less than one-half the haul of the latter. Before definite comparisons could be made, however, it would be necessary to consider the service covered by the rate. Rates to Port Colborne and Montreal include elevation charges, while rates to Buffalo do not.

The following table shows the average freight rates by water on wheat moving from Buffalo and on various grains from Port Colborne to Montreal during the season of navigation 1928:

TABLE NO. 117.—*Freight rates on grain moving by water to Montreal during the season of navigation 1928*

[Average rates per bushel in cents]

Month	From Port Colborne—				From Buffalo, wheat
	Barley	Oats	Flax	Wheat	
April				7.43	
May	5.79	5.01	3.00	6.74	6.12
June		4.11		5.48	5.03
July	3.50	3.62		5.04	4.82
August	4.85	3.67		5.04	4.92
September	5.15	3.54	5.52	5.80	5.85
October	5.91		5.00	6.83	6.66
November	6.89	5.16		7.23	7.21
December				8.19	
Average	5.46	4.05	4.55	6.13	5.80

Source: Canal Statistics, Dominion Bureau of Statistics, 1928.

NEW YORK STATE BARGE CANAL RATES

Grain rates via the barge canal vary throughout a considerable range, but not to the extent that is found on the St. Lawrence River. This is due to the influence of rates via paralleling rail lines in preventing such unreasonable pyramiding as occurs from time to time on the upper St. Lawrence. The following statement quoted from the annual report of the commissioner of canals and waterways for 1928 shows the fluctuation in the rates on the canal during that year:

Rates on grains via the canal appear to have been unusually remunerative to the boat operators during the past season, since rates did not drop nearly as low as is ordinarily the case, no lower than 4 cents per bushel on wheat, from Buffalo to New York, having been reported to this office. The customary midseason slump in grain shipments, if existent, was of short duration.

The first boatload of grain for the season on the Great Lakes arrived in Buffalo on May 5, 1928.

On the opening of navigation, the grain rates from Buffalo to New York, exclusive of elevation at both ends, free of insurance and the owner of cargo paying cost of trimming, were about as below, in cents per bushel:

Wheat, 6–6½; corn, 5¾; rye, 6¼; barley, 5¾.

Reductions followed, but up to about September 13 rates held at—

Wheat, 5¾–6; corn, 5½–5¾; rye, 5½–5¾; barley, 5½–5¾.

Beginning about this time, there was some scarcity of grain for canal shipment, due to lateness of the fall crop arriving at the head of the Lakes and the consequent failure of Great Lakes forwardings to attain large proportions. Canal boats awaiting loads accumulated at Buffalo and, for a period of approximately three weeks, grain rates averaged—

Wheat, 4–5; corn, 4; rye, 4; barley, 4.

Following this period, or about October 4, rates took on a firmer tone and promptly advanced to—

Wheat, 6–6¾; corn, 6–6½; rye, 6–6½; barley, 6–6½.

which rates held until November, when, there being more than 100 canal boats reported at Buffalo on November 9 awaiting ladings and additional vessels reported on the way west, the grain shippers succeeded in obtaining reduced rate quotations, as low as 5½ cents and 5 cents being reported on wheat and corn, with as low as 4 cents per bushel on barley, and these rates are reported to have held throughout the balance of the navigation season.

RAIL RATES TO SEABOARD

A large amount of grain is shipped all-rail to the Atlantic seaboard for export as well as for domestic use. Rates on this traffic from Chicago, St. Louis, Cairo, Minneapolis, and Kansas City are as follows:

TABLE NO. 118.—*All-rail domestic and export carload reshipping rates on grain to Atlantic ports*

[In effect Oct. 22, 1929. Rates are stated in cents per 100 pounds]

To	From—						
	Chicago	St. Louis	Cairo	Minneapolis		Kansas City	
				Wheat	Corn	Wheat	Corn
Halifax, N. S.:							
Domestic	51½	55½	64	64½	63	69	67½
Export	[1] 23½	27½	28½	36½	35	41	39½
St. John, N. B.:							
Domestic	50½	54½	63	63½	62	68	66½
Export	22½	26½	27½	35½	34	40	38½
Quebec, Quebec:							
Domestic	38	42	50½	51	49½	55½	54
Export	22½	26½	27½	35½	34	40	38½
Montreal, Quebec:							
Domestic	30	34	42½	43	41½	47½	46
Export	21½	25½	26½	34½	33	39	37½
Portland, Me.:							
Domestic	32	36	37	45	43½	49½	48
Export	22½	26½	27½	35½	34	40	38½
Boston, Mass.:							
Domestic	32	36	37	45	43½	49½	48
Export	22½	26½	27½	35½	34	40	38½
New York, N. Y.:							
Domestic	30	34	35	43	41½	47½	46
Export	22½	26½	27½	35½	34	40	38½
Philadelphia, Pa.:							
Domestic	28	32	33	41	39½	45½	44
Export	21½	25½	26½	34½	33	39	37½
Baltimore, Md.:							
Domestic	27	31	32	40	38½	44½	43
Export	21	25	26	34	32½	38½	37

[1] From certain specified points Halifax takes New York rate, 22½ cents.

Tariff authorities: Agent B. T. Jones, I. C. C. 1453 and 2046.

Rates from Minneapolis and from Kansas City are combinations through Chicago, using as first factor a proportional rate of 17½ cents on wheat and 16 cents on corn from Kansas City, and from Minneapolis a proportional rate of 13 cents on wheat and 11½ cents on corn, plus proportional rate on all grain from Chicago to seaboard.

Export rates do not include any elevator or port charges. If shipments are not entitled to export rate on account of split deliveries, or if accepted for local consumption, or if not consigned in shipping order or bill of lading for export and later ordered for exportation, rates, rules or regulations applicable to domestic traffic apply.

Grain reaching lower lake ports may move to seaboard by rail routes on rates applying to ex-lake traffic. These rates are shown in the following table:

TABLE No. 119.—*Ex-lake rates on grain in carloads from Detroit, Mich., Toledo, and Sandusky, Ohio*

[In effect Oct. 22, 1929. Rates are stated in cents per 100 pounds]

To—	Barley		Corn		Oats		Rye		Wheat	
	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export
Baltimore, Md	21	14.5	21.5	12.5	19	13	21.5	12.5	21.5	13
Boston, Mass	26	19.5	26.5	17	24	17.5	26.5	17	26.5	17.5
New York, N. Y	24	19.5	24.5	17	22	17.5	24.5	17	24.5	17.5
Philadelphia, Pa	22	14.5	22.5	12.5	20	13	22.5	12.5	22.5	13

These rates do not include any elevation services or charges.
Tariff authority: Agent B. T. Jones, I. C. C. 2046.

TABLE No. 120.—*Ex-lake rates on grain in carloads from Cleveland, Ohio*

[In effect Oct. 22, 1929. Rates are stated in cents per 100 pounds]

To—	Barley		Corn		Oats		Rye		Wheat	
	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export
Baltimore, Md	19	14.5	19.5	12.5	17	13	19.5	12.5	19.5	13
Boston, Mass	24	18.5	24.5	16	22	16.5	24.5	16	24.5	16.5
New York, N. Y	22	18.5	22.5	16	20	16.5	22.5	16	22.5	16.5
Philadelphia, Pa	20	14.5	20.5	12.5	18	13	20.5	12.5	20.5	13

These rates do not include any elevation services or charges.
Tariff authority: Agent B. T. Jones, I. C. C. 2046.

TABLE No. 121.—*Ex-lake domestic rates on grain, carloads, from West Fairport, Ohio*

[In effect Oct. 22, 1929. Rates are stated in cents per 100 pounds]

To—	Barley	Corn	Oats	Rye	Wheat
Baltimore, Md	19	19½	17	19½	19½
New York, N. Y	22	22½	20	22½	22½
Philadelphia, Pa	20	20½	18	20½	20½

These rates do not include any elevation services or charges.
Tariff authority: Agent B. T. Jones, I. C. C. 2046.

TABLE No. 122.—*Rates on grain in carloads from Fairport Harbor, Ohio*

[In effect, Oct. 23, 1929. Rates are stated in cents per 100 pounds]

To—	Barley		Corn		Oats		Rye		Wheat	
	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export
Baltimore, Md	22.5	20.5	22.5	20.5	22.5	20.5	22.5	20.5	22.5	20.5
Boston, Mass	27.5	22	27.5	22	27.5	22	27.5	22	27.5	22
New York, N. Y	25.5	22	25.5	22	25.5	22	25.5	22	25.5	22
Philadelphia, Pa	23.5	21	23.5	21	23.5	21	23.5	21	23.5	21

These rates from Fairport Harbor are not published applicable on ex lake grain and except as shown in preceding table, no rates on ex lake grain are published from either West Fairport or Fairport Harbor to seaboard for export.
Tariff authority: Agent B. T. Jones, I. C. C. 2046.

TABLE NO. 123.—*Ex-lake domestic and export rates on grain in bulk, carloads from Buffalo, Black Rock, Buffalo Lake, East Buffalo, Oswego, N. Y., and Erie, Pa.*[1]

[In effect Oct. 22, 1929. Rates are stated in cents per 100 pounds]

To—	Barley		Corn		Oats		Rye		Wheat	
	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export	Domestic	Export
Baltimore, Md	20.58	16.58	20.79	14.29	20.13	16.13	20.79	14.29	20.67	14.67
Boston, Mass	23.08	17.08	23.29	14.79	22.63	16.63	23.29	14.79	23.17	15.17
New York, N. Y	20.58	17.08	20.79	14.79	20.13	16.63	20.79	14.79	20.67	15.17
Philadelphia, Pa.[2]	20.58	16.58	20.79	14.29	20.13	16.13	20.79	14.29	20.67	14.67

[1] Export rates from Erie, Pa., do not apply to Boston, Mass., but do apply to all other ports shown.
[2] Rates do not apply for Baltimore & Ohio R. R. delivery.

Rates from Oswego, N. Y., to Boston, New York, and New York lighterage station for export are uniformly 1 cent lower than export rates shown above. Rates from Oswego, N. Y., to New York, N. Y., for domestic deliveries are uniformly 1½ cents lower than the domestic rates shown above.

The above rates, both domestic and export, include a charge of 1 cent per bushel, made by the Buffalo, Erie, and Oswego elevators named in tariff, for elevation and transfer from lake vessels to cars and 5 days storage. These rates apply also on ex lake grain from Buffalo, Erie, and Oswego elevators not named in tariff, but which have railroad track connection, but do not include any services or charges of such elevators.

Shipments moving under these rates not consigned for export but which are ordered for exportation after arrival at seaboard are subject to rates, rules, and regulations applicable on domestic traffic.

Tariff authorities: Agent Curlett's I. C. C. A222, and Agent Wilson's I. C. C. A133.

TABLE NO. 124.—*Ex-lake rates on grain, carloads, for export*

[In effect Mar. 1, 1929. From bay ports. Stated in cents per 100 pounds]

To—	Wheat	Oats	Barley	Rye	Corn
Montreal	14.34	15.07	16.04	13.90	13.90
FROM DEPOT HARBOR, GODERICH, MIDLAND, AND PORT COLBORNE					
Halifax, St. John, Quebec, Portland, and Boston	15.17	16.63	17.08	14.79	14.79
FROM GODERICH AND PORT McNICOLL					
St. John, West St. John, Boston, and Quebec	15.17	16.63	17.08	14.79	14.79

Rates to Halifax from Goderich and Port McNicoll were canceled in 1924 leaving no ex lake rates to that port.

Authority for above rates is Dominion Bureau of Statistics for year 1928.

ELEVATION AND STORAGE CHARGES

Table No. 125 shows the elevation and storage charges on grain handled at the various ports of the Great Lakes and St. Lawrence River. In connection with the figures showing elevation charges at lower lake ports, reference should be made to the explanations following Table No. 123 regarding the absorption of elevation charges on grain moving through certain elevators at these ports.

TABLE No. 125.—*Elevation and storage charges on grain at elevators on the Great Lakes and St. Lawrence River, also at Nova Scotia and New Brunswick*

Port	Elevation charges, per bushel	Free storage time, in days	Storage after free time
LAKE SUPERIOR			
Fort William	1¼ cents [1]	15	⅓₀ cent per bushel for each succeeding day.
Port Arthur	do.[1]	15	Do.
Duluth-Superior	1½ cents [2]	15	Do.
LAKE MICHIGAN			
Chicago	1¼ cents [3]	10	½₀ cent per bushel for each succeeding day.
Milwaukee	do.[3]	10	½₀ cent per bushel for each succeeding day in concrete houses; ¼ cent per bushel for each succeeding day in wooden elevators.
GEORGIAN BAY AND LAKE HURON			
Georgian Bay ports, Goderich, and Sarnia.	Domestic, 1 cent Export, ¾ cent [4]	--- [5] 15	¼ cent per bushel for each additional 10 days or fraction.[5]
LAKE ST. CLAIR			
Detroit [6]	1 cent	10	⅓₀ cent per bushel per day.
LAKE ONTARIO			
Toronto	Domestic, 1 cent Export, ¾ cent	--- [5] 15	¼ cent per bushel for each additional 10 days or fraction.[5]
LAKE ERIE			
Toledo [6]	1 cent	10	⅓₀ cent per bushel per day.
Cleveland [6]	1¼ cents	10	¼ cent per bushel per day.
Fairport [6]	1 cent	5	¼ cent per bushel each 7-day period.
Buffalo	do	5	½₈ cent per bushel per day.
Port Colborne	Export, ¾ cent [4]	15	¼ cent per bushel for each 10 days or fraction.
ST. LAWRENCE RIVER			
Ogdensburg	1 cent	---	
Montreal [7]	Export, 1 cent [4]	10	¼ cent per bushel for each of two succeeding 10-day periods and ½ cent per bushel thereafter for each 10-day period.
Quebec [7]	do.[4]	10	¼ cent per bushel for each 10 days or fraction thereof.
NEW BRUNSWICK AND NOVA SCOTIA			
St. John	Export, [1]⁹⁄₂₀ cent	10	¼ cent per bushel per day.
West St. John	do	10	Do.
Halifax	do	10	Do.

[1] This rate includes receiving, elevating, shipping, storing, and insurance against fire for first 15 days.
[2] This rate includes receiving, cleaning, and shipping.
[3] This charge includes loading and unloading.
[4] This charge on export traffic is absorbed by the carriers.
[5] This free time applies from Apr. 1 to Dec. 31. From Jan. 1 to Mar. 31, 30 days' free time is allowed after which the charge is ¼ cent per bushel for each additional 15 days or part thereof.
[6] Charges shown are the latest available.
[7] On domestic grain at Montreal and Quebec, a charge of 4 cents per bushel is assessed for unloading from lake vessels with 10 days' free storage and the same charge is made for delivery to vessels. For unloading all grain, except oats, from cars, a charge of 1 cent per bushel is assessed with 10 days' free storage.

Authorities: Various circulars, reports, etc., of the Board of Grain Commissioners for Canada; Dominion Government's department of railways and canals; annual report of the Milwaukee Chamber of Commerce for 1928-29; annual report of Duluth Board of Trade, 1928, and tariff of charges of Canadian elevators as of Oct. 4, 1929.

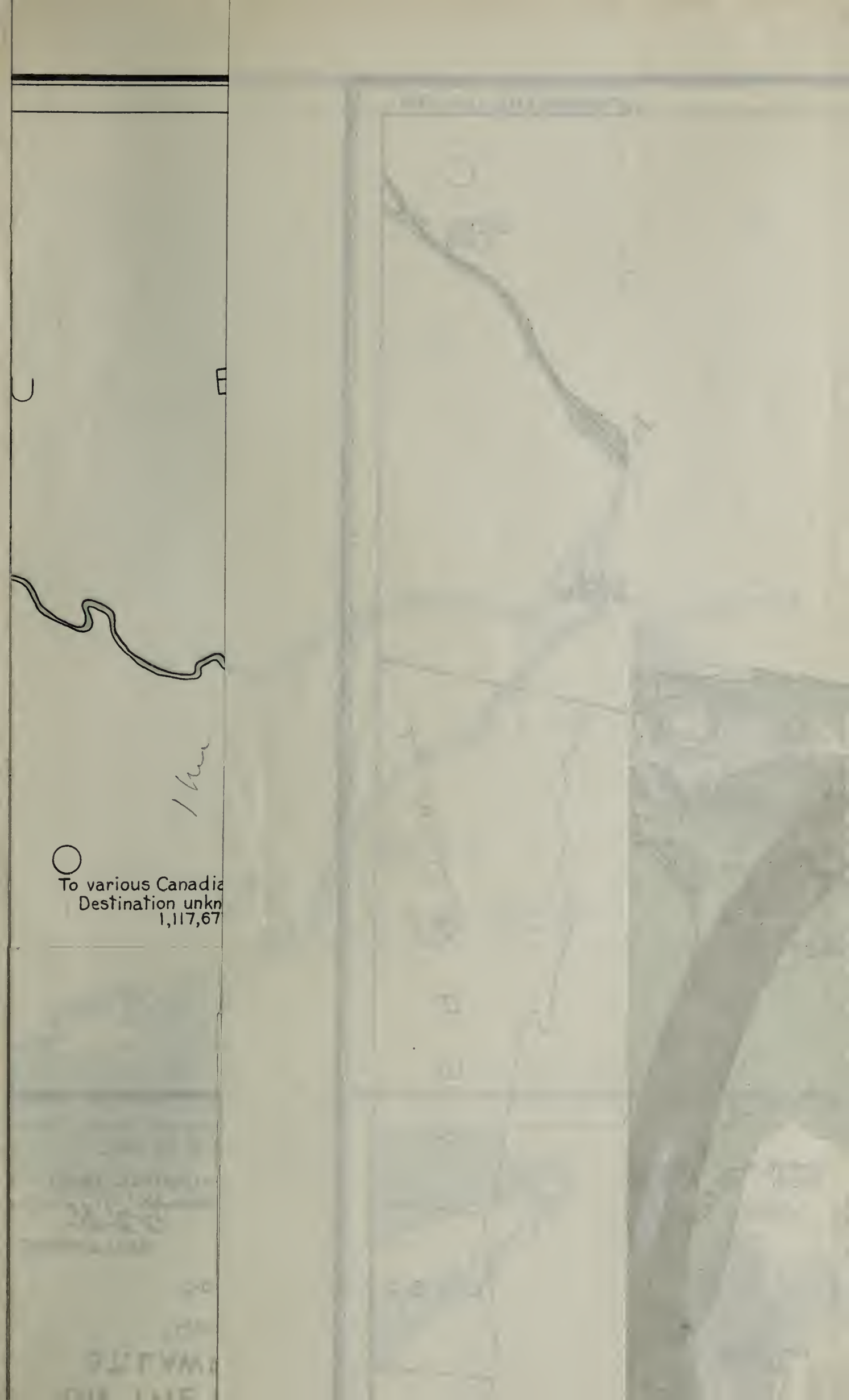
GRAIN PORTS OF THE GREAT LAKES AND ST. LAWRENCE RIVER—UPPER LAKE PORTS

FORT WILLIAM—PORT ARTHUR

The twin ports of Fort William and Port Arthur are situated on Thunder Bay on the north shore of Lake Superior. Fort William is at the mouth of the Kaministiquia River. The river has three entrance channels known as the Kaministiquia Channel, the McKellar Channel, and the Mission Channel. These channels have been dredged to a depth of 25 feet. A turning basin has been built at the junction of the McKellar Channel with the main river, and another at the junction of the Mission Channel with the main river.

Port Arthur adjoins Fort William on the north. It has an artificial harbor protected by an extensive breakwater system. The main harbor north comprises an area of 130 acres protected by a breakwater running south from Bare Point for a distance of 1,200 feet, and thence southwest for 3,000 feet. The extension of this breakwater for a distance of 2 miles in a southwest direction is proposed. The main harbor center and the main harbor south are formed by three breakwaters; the north breakwater 3,650 feet long, the middle breakwater 6,000 feet long, and the south breakwater 2,600 feet long. There are two entrances between these breakwaters, one 366 feet wide and the other 375 feet wide. The former is at the southerly end of the north breakwater and is the entrance to the main harbor center. The channel leading into the main harbor center is 350 feet wide and 20 feet deep, and the limiting depths in the harbor are from 20 to 21 feet. The channel leading into the main harbor south is 375 feet wide and 25 feet deep. The depths in this part of the harbor are from 19 to 25 feet. The depths in the main harbor north range from 12 to 24 feet.

The business of this port consists mainly of the tremendous volume of grain which funnels to this point from the prairie Provinces of the Dominion. Unlike the grain centers of the United States, a large part of the Canadian grain territory has but one outlet to the sea. The greatest production of the Dominion is in the Provinces of Manitoba and Saskatchewan, and the grain market of Winnipeg is located directly in the path of the easterly flow to the head of the Lakes. Not until recent years have the Pacific coast ports participated in handling the rapidly increasing surplus grain production of the Dominion. The task has fallen almost wholly upon the twin ports of Fort William and Port Arthur. This has led directly to the most phenomenal development of modern elevator facilities to be found at any grain-shipping port on this or any other continent.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WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF BITUMINOUS COAL ON THE GREAT LAKES AND ST. LAWRENCE RIVER, 1928

(Quantities in short tons)

Scale: 0 10 20 30 Mil. Tons

SUBMITTED:
W. C. Graves
CHIEF STATISTICIAN

APPROVED:
J. J. Loving
LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by D.W.S.

Drawn by J.E.P.

WILLIAMS & HLINTZ CO. WASH. D.C.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.

LEGEND

- • Country Shipping Points.
- ● Interior Primary Markets and Reshipping Points.
- ◉ Lake Ports.
- ★ Sea Ports.

EXPLANATION

Rates are shown in cents per bushel and are all rail unless otherwise indicated, as follows:

(1) Rail and water.
(2) All water.

Proportional rates and reshipping rates applicable to export traffic, have been used where published. Rates from country shipping points to primary markets are generally flat rates. From primary markets proportional or reshipping rail rates applying on traffic from beyond are generally quoted. Water rates via the Great Lakes and Barge Canal are average rates applying under normal conditions. Rates via the Mississippi River are as shown by current tariffs of the Mississippi-Warrior Service. Rates from Lake Erie ports apply on ex-lake grain only for export.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

FREIGHT RATES ON WHEAT

(RATES IN EFFECT NOV. 1929)
FROM INTERIOR SHIPPING POINTS
TO
PRIMARY MARKETS, LAKE AND OCEAN PORTS.

SUBMITTED: W. E. Grover
CHIEF STATISTICIAN

APPROVED: J. J. Kenny
LT. COL., CORPS OF ENGINEERS, U.S. ARMY.

DRAWN BY O.L.A. & J.E.P.

DATA BY V.L.P.

103996—30. (Face p. 164.)

The first receipts of grain at the port followed closely upon the construction of the Canadian Pacific Railway, extending from the Lakes to the western plains. The early grain shipments came in sacks in carload lots, and were handled over the freight sheds to vessels as package freight. Bulk grain, however, began to arrive before any elevator had been constructed to receive it. The steamer *Erin* took the first cargo of bulk grain in the fall of 1883. The vessel was placed at the dock and the car brought alongside. Spouting was first tried with the spouts resting on top of the grain door and extending to the hatch of the vessel, but this was not successful and runways from the car to the hatches and 2-wheel carts were tried.

With the bulk wheat arriving in increasing quantities, it became necessary to make provision for its storage during the winter months, and sheds were constructed for this purpose. At this time the first elevator had just been completed, but it was not operated until the following year.

This elevator had a capacity of 250,000 bushels, and the ships whose visits to the port marked the beginning of the grain flow had a carrying capacity of less than 20,000 bushels, while the cars which brought grain to the port had a capacity of only 12 tons and were handled in drags of only 14. The shipments of grain in 1884 reached a total of 1,500,000 bushels. In 1885 they amounted to 2,500,000 bushels and in 1886 to 3,000,000 bushel. The remarkable development of shipping on the Great Lakes is well illustrated by a local report as to the largest vessels which entered Fort William-Port Arthur in that year, as follows:

Steamer	Feet draft	Tons
Iron Duke	14	1,402
Iron Cliffe	15.2	1,624
H. D. Alverson	15	1,504
Australasia [1]	15.4	2,202

[1] The *Australasia* is the largest craft that floats on fresh water.

The second elevator of the port was constructed at Fort William and was know as Elevator A. It has a capacity of 1,250,000 bushels.

This additional elevator temporarily rendered useless the sheds which had been provided for grain storage, but in 1887 on account of the great crop of that year, these sheds had to be again utilized with the addition of a still larger shed holding approximately 750,000 bushels. Two-wheel carts and barrows were used on runways to carry the grain from the cars into the sheds. By 1889 the flow had become so great as to require the construction of an additional elevator known as Elevator B, followed by Elevator C in 1890. Elevator D was the first so-called fireproof structure. By 1902

Elevator E had been completed, thus giving the port five elevators. In 1903 the so-called fireproof steel Elevator D was destroyed by fire, and plans were then prepared for the construction of one of reinforced concrete and tile. These materials have been used in all terminal elevator construction at this port since that time.

By 1911 the total storage capacity of the port had risen to approximately 26,000,000 bushels. The crop of 1912 was exceptionally large and with the cessation of the building of elevators during the preceding years, owing to the agitation to have the Government take over all elevators, the facilities at the port were inadequate for the grain which poured in from the West, and congestion resulted. The traffic backed to the western elevators and caused great losses to the western farmers. Part of the overflow was loaded into 59 vessels which had gathered in the harbor previous to the closing of navigation. At the opening of navigation on April 19 of the following year, these vessels moved out of the harbor in practically one unbroken line constituting probably the greatest commercial fleet ever seen on the Great Lakes. Their cargo aggregated 12,000,000 bushels of wheat, oats, barley, and flax.

The situation led to a governmental announcement of its policy to allow private ownership of terminal elevators. Construction was thereupon resumed, and the storage capacity of the port was doubled within a few years. By 1929 there were 31 elevators, with a total capacity of 86,680,000 bushels. The following table shows the names and capacities of the public and private terminal elevators at the port.

TABLE No. 126.—*Grain storage capacity, Fort William-Port Arthur elevators*

FORT WILLIAM ELEVATORS

	Storage capacity	Licensed to operate as—
ON THE WATER FRONT		
	Bushels	
Grand Trunk Pacific Terminal Elevator Co. (Ltd.)	5,750,000	Public terminal.
Northland Elevator Co. (Ltd.) "D"	7,500,000	Private elevator.
Western Grain Co. (Ltd.)	3,100,000	Do.
Ogilvie Flour Mills Co. (Ltd.)	3,000,000	Do.
Searle Terminal (Ltd.)	3,000,000	Do.
Federal Grain (Ltd.) "Northwestern"	3,000,000	Do.
Federal Grain (Ltd.) "Consolidated"	1,750,000	Do.
Paterson & Co. (Ltd.) "O" and Annex "K"	2,500,000	Do.
Saskatchewan Pool Terminals (Ltd.) "Pool Terminal 8"	2,500,000	Do.
Canadian Consolidated Grain Co. (Ltd.) "Empire"	1,750,000	Do.
Fort William Elevator Co. (Ltd.) "F"	1,750,000	Do.
Electric Elevator & Grain Co. (Ltd.)	1,000,000	Do.
INLAND		
National Elevator Co. (Ltd.) "D & S"	85,000	Do.
McCabe Bros. Grain Co. (Ltd.)	35,000	Do.
Electric Elevator & Grain Co. (Ltd.) "Bole"	20,000	Do.
Total (15)	36,740,000	

TABLE No. 126.—*Grain storage capacity, Fort William-Port Arthur elevators*—Continued

PORT ARTHUR ELEVATORS

	Storage capacity	Licensed to operate as—
ON THE WATER FRONT		
	Bushels	
Canadian Government elevator	3,250,000	Public terminal.
Saskatchewan Pool Terminals (Ltd.) "Pool Terminal 4"	6,565,000	Do.
Saskatchewan Pool Terminals (Ltd.) "Pool Terminal 6"	7,400,000	Do.
Saskatchewan Pool Terminals (Ltd.) "Pool Terminal 7"	6,900,000	Do.
Saskatchewan Pool Terminals (Ltd.) "Pool Terminal 5"	2,100,000	Private elevator.
United Grain Growers' Terminals (Ltd.) "A"	5,500,000	Do.
Reliance Grain Co. (Ltd.)	3,800,000	Do.
Eastern Terminal Elevator Co. (Ltd.) "Richardson"	3,500,000	Do.
Bawlf Terminal Elevator Co. (Ltd.)	2,350,000	Do.
Federal Grain Co. (Ltd.) "Stewart"	2,250,000	Do.
Canadian Consolidated Grain Co. (Ltd.) "Thunder Bay"	1,500,000	Do.
Manitoba Wheat Pool "Pool Terminal No 1"	1,300,000	Do.
Manitoba Wheat Pool "Pool Terminal No 2"	1,375,000	Do.
Union Terminal (Ltd.)	1,200,000	Do.
Superior Elevator Co. (Ltd.) "P & H"	900,000	Do.
INLAND		
National Elevator Co. (Ltd.)	50,000	Do.
Total (16)	49,940,000	
Total, public terminals	29,865,000	
Total, private elevators	56,815,000	
Grand total, 31 elevators	86,680,000	

Detailed information regarding these elevators is given in the following table:

GRAIN ELEVATORS

TABLE No. 127.—*Port of Fort William, Ontario*

Name of elevator	Grand Trunk Pacific
Location on water front	Near mouth of Mission River.
Owned by	Canadian National Rys.
Operated by	Grand Trunk Pacific Elevator Co. (Ltd.).
Licensed as	Public terminal elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23 feet.
Storage capacity	5,750,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	24 cars.
Elevator to vessel	75,000 bushels.
Elevator to car, number of cars	24 cars.
Equipment for unloading and loading	5 receiving legs and scales, 5 shipping legs and scales, 12 shipping bins, 6 loading spouts to vessels, 5 loading spouts to cars.
Other equipment	1 Hess drier, 1,000-bushel unit; 1 Randolph drier, 500-bushel unit.
Name of railroad connecting	Canadian National.
Tracks at elevator, number	4.

Name of elevator	Northland "D"
Location on water front	On bank of Kaminisqiquia River, south of Mission turning basin.
Owned by	Canadian Pacific Ry.
Operated by	Northland Elevator Co. (Ltd.).
Licensed as	Private terminal elevator.
Type of construction	Part reinforced concrete, part steel, and part tile.
Depth of water in berth (feet)	23 feet.
Storage capacity	7,500,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	20 cars.
Elevator to vessel	96,000 bushels.
Elevator to car, number of cars	12 cars.
Equipment for unloading and loading	4 receiving legs and scales, 12 shipping legs and scales, 13 loading spouts to vessels, 8 loading spouts to cars.
Other equipment	1 Randolph drier, 1,000 bushels per hour.
Name of railroad connecting	Canadian Pacific.
Tracks at elevator, number	4.

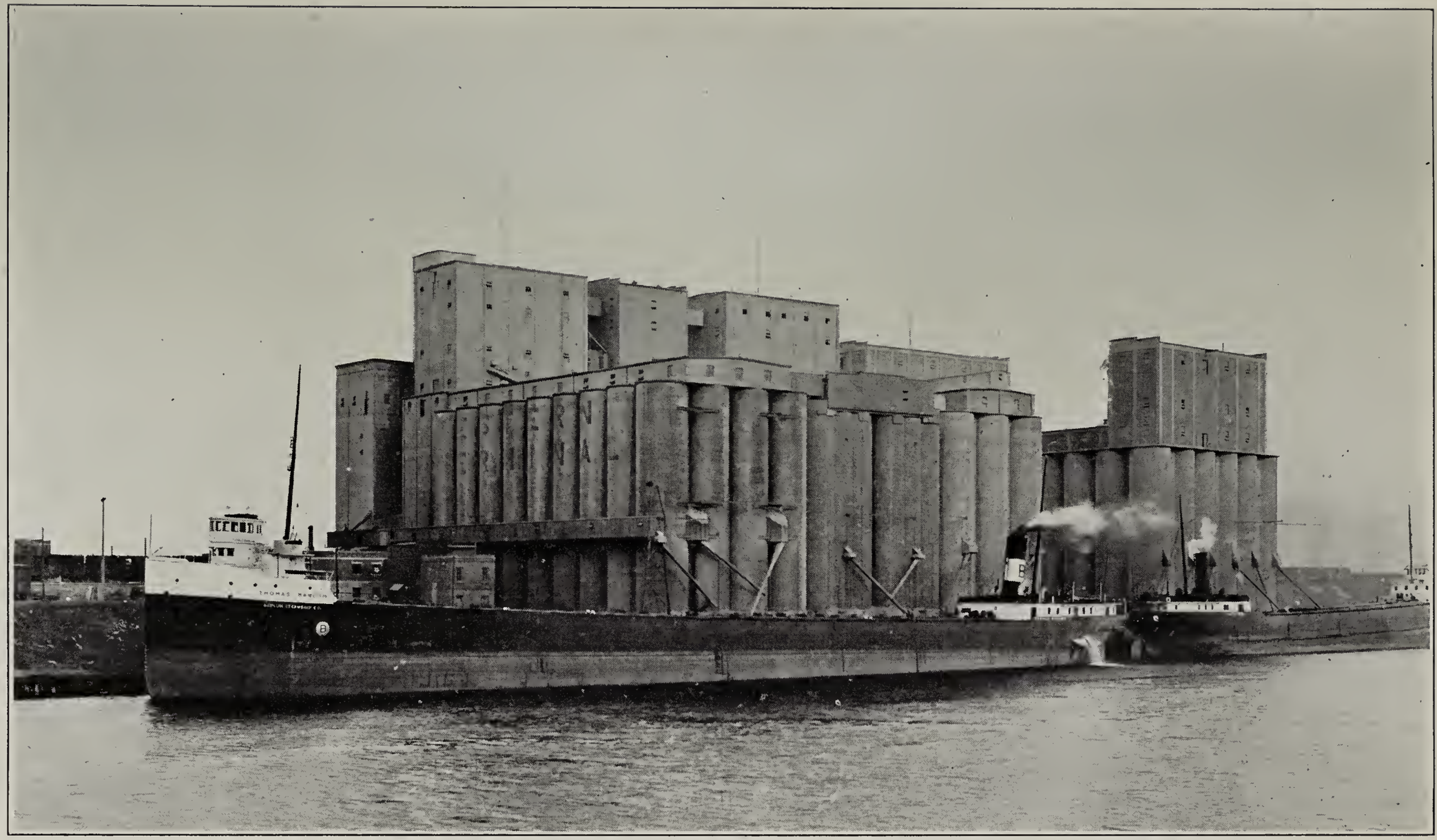
TABLE No. 127.—*Port of Fort William, Ontario*—Continued

Name of elevator	Western
Location on water front	On bank of Kaministiquia River, foot of Edward Street.
Owned by	Western Grain Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete and hollow tile.
Depth of water in berth (feet)	23 feet.
Storage capacity	3,100,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	22 cars.
Elevator to vessel	50,000 bushels.
Elevator to car, number of cars	25 cars.
Equipment for unloading and loading	7 receiving legs and scales, 7 shipping legs and scales, 10 shipping bins, 7 loading spouts to vessels, 8 loading spouts to cars.
Other equipment	1 Ellis drier, 350 bushels per hour.
Name of railroad connecting	Canadian National Rys. and Canadian Pacific Ry.
Tracks at elevator, number	3.

Name of elevator	Ogilvie
Location on water front	On Kaministiquia River, immediately north of bascule bridge.
Owned by	The Ogilvie Flour Mills Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete and all steel.
Depth of water in berth (feet)	23.
Storage capacity	3,000,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	7 cars.
Elevator to vessel	30,000 bushels.
Elevator to car, number of cars	4 cars.
Equipment for unloading and loading	2 receiving legs and scales; 2 shipping legs and scales; 2 galleries, each with 1 loading spout to vessels and 1 loading spout to cars.
Other equipment	One Morris drier, 500 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry.
Tracks at elevator, number	2.

Name of elevator	Searle
Location on water front	Near mouth of Mission River.
Owned by	Searle Terminal (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	3,000,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	8 cars.
Elevator to vessel	50,000 bushels.
Elevator to car, number of cars	8 cars.
Equipment for unloading and loading	2 receiving legs and scales, 2 shipping legs and scales, 2 shipping spouts to vessels, 2 shipping spouts to cars.
Other equipment	1 Randolph drier, 2,000-bushel unit.
Name of railroad connecting	Canadian National Rys., but interswitching from C. P. R. free.
Tracks at elevator, number	4.

Name of elevator	Northwestern
Location on water front	On bank of Kaministiquia River alongside Neebing Avenue.
Owned by	Federal Grain (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete throughout.
Depth of water in berth (feet)	23.
Storage capacity	3,000,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	12 cars.
Elevator to vessel	45,000 bushels.
Elevator to car, number of cars	8 cars.
Equipment for unloading and loading	2 receiving legs and scales, 4 shipping legs and scales, 4 shipping bins, 4 loading spouts to vessels, 2 loading spouts to cars.
Other equipment	1 Hess and 1 Ellis drier, built together as one unit of 1,000 bushels; 1 Randolph drier, 2,000 bushels per hour; 1 Randolph drier, 1,000 bushels per hour.
Name of railroad connecting	Canadian National Rys. and Canadian Pacific Ry.
Tracks at elevator, number	4.



WESTERN TERMINAL ELEVATOR, FORT WILLIAM, ONTARIO (CAPACITY, 3,100,000 BUSHELS)

TABLE NO. 127.—*Port of Fort William, Ontario*—Continund

Name of elevator	Consolidated
Location on water front	On Kaministiquia River, foot of Ford Street.
Owned by	Federal Grain (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete and hollow tile.
Depth of water in berth (feet)	23.
Storage capacity	1,750,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	8 cars.
Elevator to vessel	25,000 bushels.
Elevator to car, number of cars	4 cars.
Equipment for unloading and loading	2 receiving legs and scales, 5 shipping legs and scales, 5 shipping bins, 5 loading spouts to vessels.
Other equipment	One Randolph drier, 1,000 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry.
Tracks at elevator, number	2.

Name of elevator	Paterson "O"
Location on water front	On Kaministiquia River, foot of Heath Street.
Owned by	N. M. Paterson & Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	2,435,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	12 cars.
Vessel to elevator	Marine leg, 10,000 bushels per hour.
Elevator to vessel	45,000 bushels.
Elevator to car, number of cars	6 cars per hour.
Equipment for unloading and loading	2 receiving legs and scales, 2 shipping legs and scales, 2 shipping spouts to vessels, 2 shipping spouts to cars, 1 marine unloading leg.
Other equipment	1 Randolph drier, 750 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	4.

Name of elevator	Paterson "K"
Location on water front	Junction of C. P. R. and C. N. R., West Fort William.
Owned by	N. M. Paterson & Co. (Ltd.).
Operated by	Do.
Licensed as	Considered as a part of annex of Elevator "O."
Type of construction	Wood, metal clad.
Depth of water in berth (feet)	23.
Storage capacity	65,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	1.
Elevator to vessel	None.
Elevator to car, number of cars	1.
Equipment for unloading and loading	1 receiving leg, 1 shipping leg, 1 car-loading spout.
Other equipment	An underground pneumatic suction piper connects this elevator with Elevator "O," enabling transfer from the inland to water-front house for storage and shipment.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator, number	2.

Name of elevator	Pool Terminal No. 8
Location on water front	On bank of Kaministiquia River, opposite foot of Victoria Avenue.
Owned by	Canadian Pacific Ry.
Operated by	Saskatchewan Pool Terminals (Ltd.).
Licensed as	Private elevator.
Type of construction	"B," reinforced concrete and tile. "E," all steel bins.
Depth of water in berth (feet)	23.
Storage capacity	2,500,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	10 cars.
Elevator to vessel	20,000 bushels.
Elevator to car, number of cars	6 cars.
Equipment for unloading and loading	4 receiving legs and scales, 6 shipping legs and scales, 9 loading spouts to vessels, 4 loading spouts to cars.
Other equipment	1 Morris drier, 1,000-bushel unit.
Name of railroad connecting	Canadian Pacific.
Tracks at elevator, number	2.

TABLE No. 127.—*Port of Fort William, Ontario*—Continued

Name of elevator	Empire
Location on water front	At mouth of Kaministiquia River.
Owned by	Canadian Consolidated Grain Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Wooden, metal clad workhouse; tile storage tanks.
Depth of water in berth (feet)	23.
Storage capacity	1,750,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	10 cars.
Elevator to vessel	40,000 bushels.
Elevator to car, number of cars	16 cars.
Equipment for unloading and loading	4 receiving legs and scales, 4 shipping legs and scales, 8 shipping bins, 8 loading spouts to vessels, 4 loading spouts to cars.
Other equipment	1 Morris drier, 500-bushel unit.
Name of railroad connecting	Canadian Pacific.
Tracks at elevator, number	2.

Name of elevator	Fort William "F"
Location on water front	On bank of Kaministiquia River, between Consolidated and Western Elevators.
Owned by	Fort William Elevator Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	1,750,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	10 cars.
Elevator to vessel	40,000 bushels.
Elevator to car, number of cars	10 cars.
Equipment for unloading and loading	3 receiving legs and scales, 3 shipping legs and scales, 6 shipping bins, 6 loading spouts to vessels, 3 loading spouts to cars.
Other equipment	1 Morris drier, 1,000 bushels per hour.
Name of railroad connecting	Canadian Pacific.
Tracks at elevator, number	2.

Name of elevator	Electric
Location on water front	On Kaministiquia River alongside Neebing Avenue.
Owned by	Electric Elevator & Grain Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Workhouse of wood, metal clad; storage annex of reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	1,000,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	10 cars.
Elevator to vessel	40,000 bushels.
Elevator to car, number of cars	6 cars.
Equipment for unloading and loading	1 receiving leg and scale, 3 shipping legs and scales, 3 shipping legs to vessels, 2 shipping legs to cars.
Other equipment	1 Randolph drier, 1,000 bushels per hour; 1 Ellis drier, 600 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	4.

Name of elevator	National "D. & S."
Location	"Union Center" at northern extremity of Fort William.
Owned by	Owner unknown.
Operated by	National Elevator Co. (Ltd.).
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth	Not on water front.
Storage capacity	85,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	1 car.
Elevator to car, number of cars	Do.
Equipment for unloading and loading	1 receiving or shipping leg and scale, 1 car spout.
Other equipment	1 Morris drier, 500-bushel unit.
Name of railroad connecting	Canadian National Rys.
Tracks at elevator, number	1.

TABLE NO. 127.—*Port of Fort William, Ontario*—Continued

Name of elevator	McCabe
Location	Inland; Athabasca Street.
Owned by	McCabe Bros. Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Wood, metal clad.
Depth of water in berth	Not on water front.
Storage capacity	35,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	1 car.
Elevator to vessel	None.
Elevator to car, number of cars	1 car.
Equipment for unloading and loading	1 receiving or shipping leg and scale, 1 loading spout to cars.
Other equipment	1 Ellis drier, 500-bushel unit.
Name of railroad connecting	Canadian Pacific.
Tracks at elevator, number	2.

Name of elevator	Bole
Location	Hardisty Street.
Owned by	Electric Elevator & Grain Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Wood, metal clad.
Depth of water in berth	Not on water front.
Storage capacity	20,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	1 car.
Elevator to car	Do.
Equipment for unloading and loading	1 receiving or shipping leg and scale, 1 car spout.
Other equipment	None.
Name of railroad connecting	Canadian Pacific Ry.
Tracks at elevator, number	1.

Name of elevator	Davidson
Location	Arthur Street.
Owned by	J. Davidson & Co.
Operated by	Do.
Licensed as	Manufacturing elevator.
Type of construction	Wood, metal clad.
Depth of water in berth	Not on water front.
Storage capacity	10,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	1 car.
Elevator to car, number of cars	Do.
Equipment for unloading and loading	1 receiving or shipping leg and scale, 1 car spout.
Other equipment	None.
Name of railroad connecting	Canadian National Rys.
Tracks at elevator, number	1.

TABLE NO. 128.—*Port of Port Arthur, Ontario*

Name of elevator	Canadian Government
Location on water front	Main harbor south.
Owned by	Canadian Government.
Operated by	Board of Grain Commissioners for Canada.
Licensed as	Public terminal elevator.
Type of construcion	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	3,250,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	20 cars.
Elevator to vessel	75,000 bushels.
Elevator to car, number of cars	10 cars.
Equipment for unloading and loading	5 receiving legs and scales, 5 shipping legs and scales, 14 shipping bins, 7 loading spouts to vessels, 5 loading spouts to cars.
Other equipment	1 Morris drier; 2 units, 1,000 bushels each.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator, number	4.

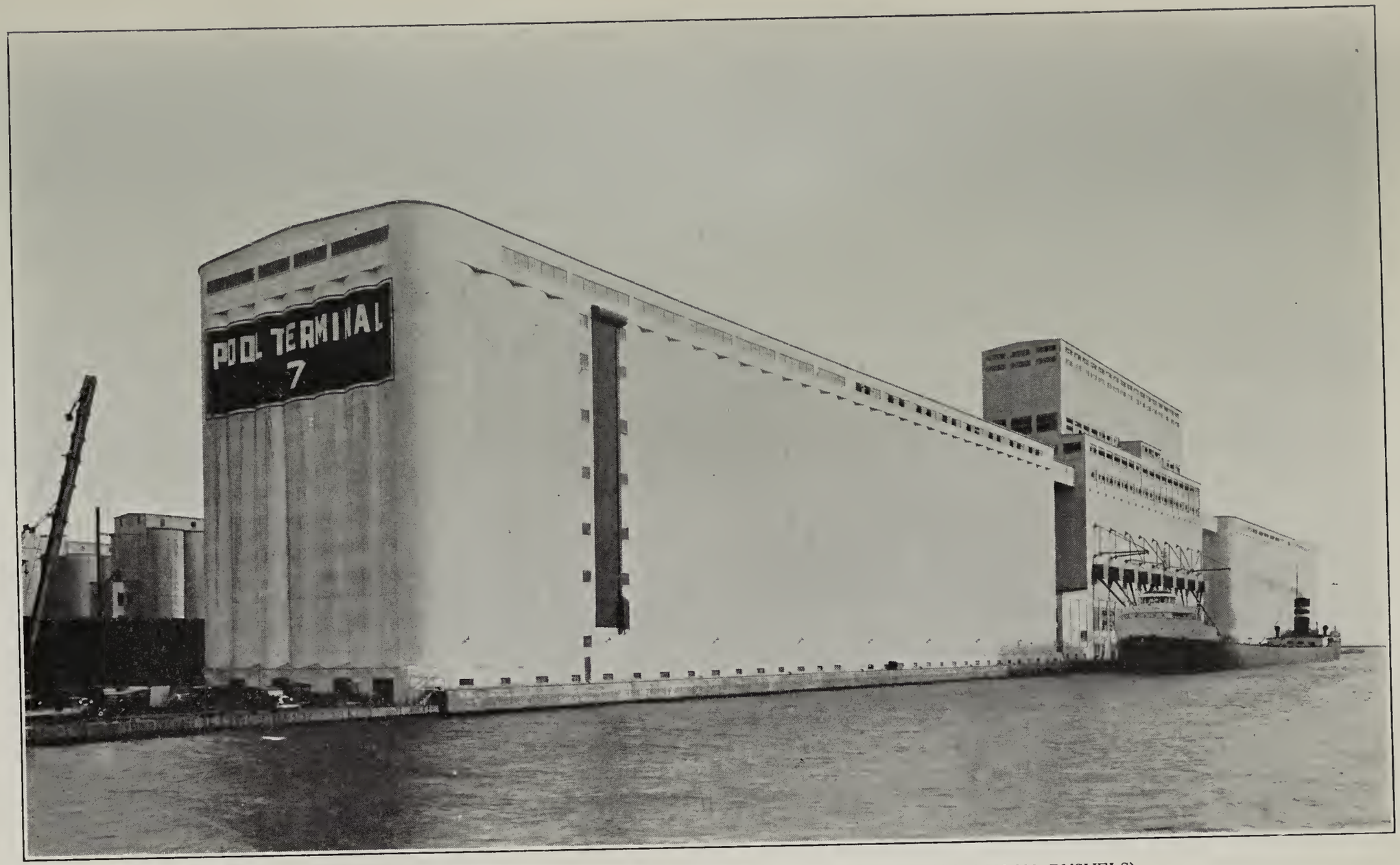
TABLE No. 128.—*Port of Port Arthur, Ontario*—Continued

Name of elevator	Pool Terminal No. 4
Location on water front	Main harbor north.
Owned by	Saskatchewan Cooperative Wheat Producers (Ltd.).
Operated by	Saskatchewan Pool Terminals (Ltd.).
Licensed as	Public terminal.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	6,565,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	20 cars.
Elevator to vessel	60,000 bushels.
Elevator to car, number of cars	10 cars.
Equipment for unloading and loading	4 receiving legs and scales, 4 shipping legs and scales, 12 shipping bins, 6 loading spouts to vessels, 8 loading spouts to cars.
Other equipment	2 Ellis drier units, 1,500 bushels each.
Name of railroad connecting	Canadian Pacific Ry.
Tracks at elevator, number	4.

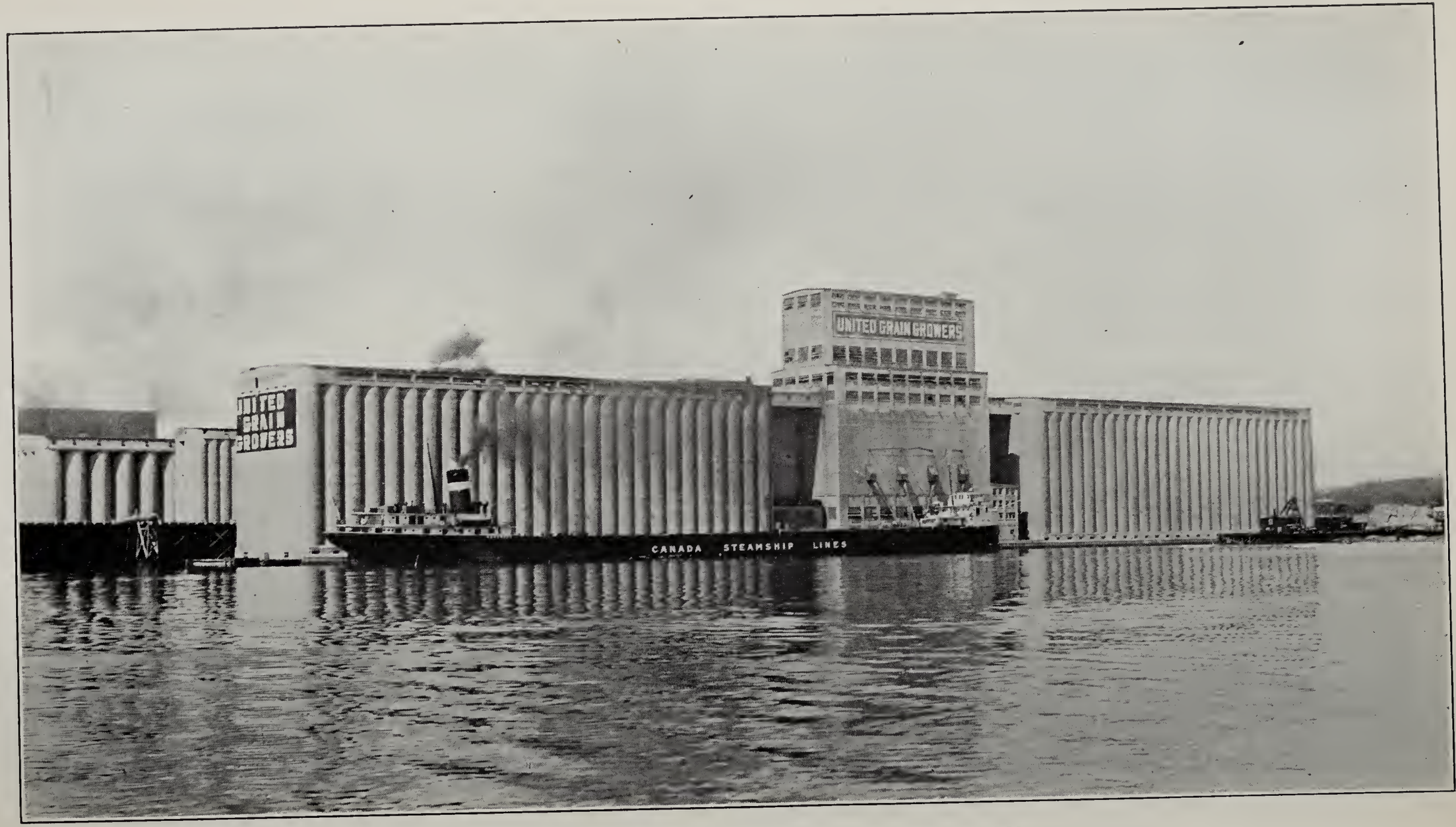
Name of elevator	Pool Terminal No. 6
Location on water front	Main harbor.
Owned by	Canadian National Rys.
Operated by	Saskatchewan Cooperative Wheat Producers (Ltd.).
Licensed as	Public terminal.
Type of construction	Workhouse, reinforced concrete; storage tanks, tile.
Depth of water in berth (feet)	23.
Storage capacity	7,400,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	28 cars.
Elevator to vessel	60,000 bushels.
Elevator to car, number of cars	10 cars.
Equipment for unloading and loading	4 automatic car unloaders, 4 pairs power shovels, 4 receiving legs and scales, 5 shipping legs and scales, 10 shipping bins, 5 shipping spouts to vessels, 5 shipping spouts to cars.
Other equipment	1 Hess drier, 2 Morris driers. Total, 4,000 bushels per hour.
Name of railroad connecting	Canadian National.
Tracks at elevator, number	4.

Name of elevator	Pool Terminal No. 7
Location on water front	Main harbor, south.
Owned by	Saskatchewan Cooperative Wheat Producers (Ltd.).
Operated by	Saskatchewan Pool Terminals (Ltd.).
Licensed as	Public terminal elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	6,900,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	35 cars.
Vessel to elevator	Marine leg, 12,000 bushels.
Elevator to vessel	150,000 bushels.
Elevator to car, number of cars	10 cars.
Equipment for unloading and loading	5 receiving legs and scales, 6 shipping legs and scales, 9 shipping spouts to vessels, 6 shipping spouts to cars, 1 marine unloading leg, 12,000 bushels per hour, 5 automatic car unloaders, 5 pairs power shovels for unloading cars.
Other equipment	1 Morris drier, 1,000-bushel unit.
Name of railroad connecting	Canadian National Rys. and Canadian Pacific Ry.
Tracks at elevator, number	5.

Name of elevator	Pool Terminal No. 5
Location on water front	Main harbor, north.
Owned by	Saskatchewan Cooperative Wheat Producers (Ltd.).
Operated by	Saskatchewan Pool Terminals (Ltd.).
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	2,100,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	8 cars.
Elevator to vessel	30,000 bushels.
Elevator to car, number of cars	6 cars.
Equipment for unloading and loading	2 receiving legs and scales, 2 shipping legs and scales, 2 vessel-loading spouts, 2 car-loading spouts.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator, number	2.



POOL TERMINAL ELEVATOR NO. 7, PORT ARTHUR, ONTARIO (CAPACITY, 6,900,000 BUSHELS)



UNITED GRAIN GROWERS' ELEVATOR, PORT ARTHUR, ONTARIO

CAR SHEDS FOR UNLOADING AT UNITED GRAIN GROWERS' ELEVATOR, PORT ARTHUR, ONTARIO

172—3

LOADING BERTH, UNITED GRAIN GROWERS' ELEVATOR, PORT ARTHUR, ONTARIO

172—4

TABLE No. 128.—*Port of Port Arthur, Ontario*—Continued

Name of elevator	United Grain Growers' "A"
Location on water front	Main harbor, north.
Owned by	United Grain Growers' (Ltd.).
Operated by	United Grain Growers' Terminals (Ltd.).
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	5,500,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	20 cars.
Elevator to vessel	80,000 bushels.
Elevator to car, number of cars	20 cars per hour.
Equipment for unloading and loading	3 receiving legs and scales, 4 shipping legs and scales, 4 shipping spouts to vessels, 4 shipping spouts to cars, 3 automatic car unloaders, 1 pair power shovels for unloading cars.
Other equipment	1 Morris drier, 1,000-bushel unit.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator number	4.

Name of elevator	Reliance
Location on water front	Main harbor, south.
Owned by	Reliance Grain Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	3,800,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	12 cars.
Elevator to vessel	50,000 bushels.
Elevator to car, number of cars	10 cars.
Equipment for unloading and loading	2 receiving legs and scales, 3 shipping legs and scales, 3 shipping spouts to vessels, 4 shipping spouts to cars.
Other equipment	2 Randolph driers, 1,500 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	3.

Name of elevator	"Richardson"
Location on water front	Main harbor, north.
Owned by	Jas. Richardson & Sons (Ltd.).
Operated by	Eastern Terminal Elevator Co. (Ltd.).
Licensed as	Private elevator.
Type of construction	Concrete and steel.
Depth of water in berth (feet)	23.
Storage capacity	3,500,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	18 cars.
Vessel to elevator	Marine leg, 12,000 bushels.
Elevator to vessel	50,000 bushels.
Elevator to car, number of cars	6 cars.
Equipment for unloading and loading	3 receiving legs, 3 receiving scales, 3 shipping legs, 4 shipping scales, 5 spouts to vessels, 3 spouts to cars, 1 marine tower.
Other equipment	1 Morris drier, 1,000-bushel unit.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator, number	4 unloading tracks and 1 additional track for loading cars only.

Name of elevator	Bawlf
Location on water front	Main harbor, south.
Owned by	The Bawlf Terminal Elevator Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	2,350,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	12 cars.
Elevator to vessel	35,000 bushels.
Elevator to car, number of cars	8 cars.
Equipment for unloading and loading	2 receiving legs and scales, 3 shipping legs and scales, 3 shipping bins, 3 loading spouts to vessels, 2 loading spouts to cars.
Other equipment	1 Morris drier, 1,000 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	3.

TABLE No. 128—*Port of Port Arthur, Ontario*—Continued

Name of elevator	Stewart
Location on water front	Main harbor, south.
Owned by	Federal Grain (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	2,250,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	12 cars.
Elevator to vessel	45,000 bushels.
Elevator to car, number of cars	12 cars.
Equipment for unloading and loading	2 receiving legs and scales, 3 shipping legs and scales, 3 shipping bins, 3 loading spouts to vessels, 4 loading spouts to cars.
Other equipment	1 Morris drier, 1,000 bushels per hour.
Name of railroads connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	3.

Name of elevator	Thunder Bay
Location on water-front	Main harbor, south.
Owned by	Canadian Consolidated Grain Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Workhouse of wood, metal clad; storage annex of reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	1,500,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	12.
Elevator to vessel	30,000 bushels.
Elevator to car, number of cars	18.
Equipment for unloading and loading	3 receiving legs, 3 receiving scales, 3 shipping legs, 3 shipping scales, 6 shipping bins, 6 shipping spouts to vessels, 6 shipping spouts to cars.
Other equipment	1 Morris drier, 1,000-bushel unit.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator, number	3.

Name of elevator	Pool Terminal No. 1
Location on water front	Main harbor, south.
Owned by	Manitoba wheat pool.
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete, tile paneling.
Depth of water in berth (feet)	23.
Storage capacity	1,300,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	7.
Vessel to elevator	Marine leg, 12,000 bushel per hour.
Elevator to vessel	25,000 bushels.
Elevator to car, number of cars	20.
Equipment for unloading and loading	1 receiving leg and scale, 2 shipping legs and scales, 5 shipping bins, 5 loading spouts to vessels, 2 loading spouts to cars, 1 marine unloading leg.
Other equipment	Morris drier, 500-bushel unit.
Name of railroad connecting	Canadian National and Canadian Pacific Rys.
Tracks at elevator, number	2.

TABLE No. 128—*Port of Port Arthur, Ontario*—Continued

Name of elevator	Pool Terminal No. 2
Location on water-front	Main harbor, north.
Owned by	John Gillespie.
Operated by	Manitoba wheat pool.
Licensed as	Private elevator.
Type of construction	Workhouse of wood, metal clad; storage annex of reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	1,375,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	5.
Elevator to vessel	30,000 bushels.
Elevator to car, number of cars	15.
Equipment for unloading and loading	1 receiving leg and scale, 3 shipping legs and 2 shipping scales, 2 loading spouts to vessels, 2 loading spouts to cars.
Name of railroad connecting	Canadian Pacific.
Tracks at elevator, number	2.

Name of elevator	Union
Location on water front	Main harbor, north.
Owned by	Union Terminal (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Workhouse of wood, metal clad; storage reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	1,200,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	6.
Elevator to vessel	25,000 bushels.
Elevator to car, number of cars	8.
Equipment for unloading and loading	2 receiving legs and scales, 2 shipping legs and scales, 2 shipping bins, 2 loading spouts to vessels, 2 loading spouts to cars.
Other equipment	1 Ellis drier, 400 bushels per hour, 2 Hess driers, 400 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	2.

Name of elevator	Superior "P. & H."
Location on water front	Main harbor south.
Owned by	Parrish & Heimbecker (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Reinforced concrete.
Depth of water in berth (feet)	23.
Storage capacity	900,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	4.
Elevator to vessel	25,000 bushels.
Elevator to car, number of cars	6.
Equipment for unloading and loading	2 receiving legs and scales, 3 shipping legs and scales, 2 shipping bins, 2 loading spouts to vessels and 2 loading spouts to cars.
Other equipment	1 Morris drier, 800 bushels per hour.
Name of railroad connecting	Canadian Pacific Ry. and Canadian National Rys.
Tracks at elevator, number	2.

Name of elevator	National
Location on water front	Not on waterfront; at foot of Second Avenue.
Owned by	National Elevator Co. (Ltd.).
Operated by	Do.
Licensed as	Private elevator.
Type of construction	Wood, metal clad.
Depth of water in berth	Not on waterfront.
Storage capacity	50,000 bushels.
Normal unloading and loading capacity per hour:	
Car to elevator, number of cars	2.
Elevator to vessel	None.
Elevator to car, number of cars	2.
Equipment for unloading and loading	1 receiving leg and scale, 1 shipping leg and scale, 1 car spout.
Other equipment	1 Hess drier, 200 bushels unit.
Name of railroad connecting	Canadian National.
Tracks at elevator, number	1.

Some remarkable records have been made at this port, of which the following are examples:

Greatest quantity of all grain in store at Fort William-Port Arthur elevators at one time

Grain	Bushels	Date
Wheat	66,119,195	Apr. 19, 1929
Oats	6,321,132	
Barley	7,264,656	
Flaxseed	723,010	
Rye	2,116,105	
Total	82,544,098	

Greatest quantity of each individual kind of grain in store at Fort William-Port Arthur terminal elevators

Grain	Bushels	Week ending
Wheat	66,119,195	Apr. 19, 1929
Oats	15,559,880	Apr. 15, 1921
Barley	7,733,164	Nov. 16, 1928
Flaxseed	3,741,512	June 25, 1914
Rye	3,507,694	May 18, 1923

Greatest quantity of each individual kind of grain shipped by vessels from Fort William-Port Arthur in any one crop year

Grain	Bushels	Crop year
Wheat	293,435,687	1928–29
Oats	59,794,510	1915–16
Barley	40,237,312	1928–29
Flaxseed	15,927,286	1912–13
Rye	12,249,729	1927–28

Greatest quantity of grain handled

	Bushels
For calendar year 1928	423,925,145
For crop year:	
1928–29	409,717,463
1915–16	382,756,460
1923–24	382,571,221

Greatest number of cars unloaded at Fort William-Port Arthur elevators in one day: October 2, 1928, 2,748½ cars. Total net contents, 3,794,208 bushels.

Greatest number of bushels unloaded at Fort William-Port Arthur elevators in any one day: October 2, 1928, 3,904,208 bushels from 2,748½ cars and two transfer cargoes.

Greatest number of cars and bushels from the West unloaded at Fort William-Port Arthur elevators in any one day: October 2, 1928, 2,705½ cars, 3,736,574 bushels.

Greatest quantity of grain shipped from Fort William-Port Arthur elevators in any one single day:

November 29, 1928:	Bushels
To vessels	6,344,808
To cars	17,809
Rail transfers	33,197
Total	6,395,814

Other days when shipments from Fort William-Port Arthur were quite substantial:

	Bushels
Nov. 28, 1928	6, 330, 777
Nov. 27, 1928	6, 280, 437
Nov. 26, 1928	5, 920, 628
Dec. 1, 1915	5, 678, 060
Nov. 29, 1923	5, 547, 998
Nov. 28, 1922	5, 392, 092

Largest (heaviest) cargo of grain loaded from Fort William-Port Arthur elevators: S. S. *Lemoyne*, July 26, 1929—Wheat, 571, 796–30 bushels or 17,153.9 tons.

Largest full cargo of oats: S. S. *W. Grant Morden*, December 7, 1915—Oats, 760,058–28 bushels or 12,920 tons.

The business at Fort William-Port Arthur is not confined entirely to grain. Its strategic position at the Canadian head of the Lakes makes it the natural transfer point for joint rail and water business moving between the East and the prairie Provinces. Excluding grain the chief commodity moving eastbound and transferred from rail to water carriers is flour from the mills at Winnipeg, Keewatin, Kenora, and other points.

DULUTH-SUPERIOR

The port of Duluth-Superior's situation at the extreme westerly end of Lake Superior places it most advantageously for handling grain from Minnesota and the Dakotas. Although Fort William-Port Arthur is located on the north shore of Lake Superior, there is little or no competition between these two ports, since the grain moving through Fort William-Port Arthur is almost entirely of Canadian origin, while that moving through Duluth-Superior is almost entirely American. There are no other ports on Lake Superior competing with these two for the grain from the northerly States and Canadian Provinces.

There are 27 grain elevators at Duluth-Superior. Some of these, however, are merely storage annexes or additions to the parent houses. The total capacity of all elevators at the port is 43,950,000 bushels. Of the 27 elevators, 18 are equipped for unloading from cars and 15 for loading out to cars. Five are equipped for unloading vessels and 13 for loading vessels. Four have machinery for unloading from cars and elevating, but are not provided with spouts for loading vessels. Eight are used for storage only and have no separate facilities for shipping.

The following table shows the names and storage capacities of elevators at this port. It is followed by tables giving detailed information regarding each elevator:

TABLE NO. 129—*Names and capacities of elevators at Duluth-Superior*

Operator	Name or number	Storage capacity (bushels)
Occident Terminal Co	Occident	2,500,000
Globe Elevator Co	1	800,000
Do	2	1,850,000
Do	3	1,850,000
Itasca Elevator Co	Itasca	1,800,000
A. D. Thomson & Co	S. & Annex	8,500,000
Do	X	1,500,000
Spencer, Kellogg & Sons (Inc.)	Kellogg	750,000
Cargill Grain Co	K	650,000
Do	L	1,600,000
Do	M	450,000
Do	N	2,325,000
Duluth-Superior Milling Co	Lake Superior and Listman.	850,000
Peavey Duluth Terminal Co	PV	4,000,000
Duluth Universal Milling Co		25,000
Capitol Elevator Co	4	900,000
Do	5	600,000
Do	6	750,000
Do	7	1,000,000
Consolidated Elevator Co	B	1,000,000
Do	C	1,200,000
Do	D	2,300,000
Do	E	1,300,000
Do	F	1,400,000
Do	G	1,600,000
Do	H	1,200,000
Do	I	1,250,000
Total	27	43,950,000

GRAIN ELEVATORS

TABLE NO. 130.—*Port of Duluth-Superior*

Name or number	Occident elevator
Owner	Occident Terminal Co.
Operator	Same.
Exact location	Rice's Point, Arthur and Elm Avanues.
Type of construction	Concrete, fireproof.
Depth of water in berth (feet)	22-27.
Storage capacity, bushels:	
Maximum	2,500,000.
Normal operating capacity	2,250,000.
Number of bins	53 tanks, total of 192 bins.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	10,000.
Elevator to ship	38,000.
Ship to elevator	15,000.
Elevator to car	10,000.
Equipment for loading and unloading	From cars—8 pits—2 lofter legs; to cars, 2 spouts; from vessel, marine leg; to vessel, 3 spouts from 3 pairs of vessel shipping bins.
Name of railroad connecting	Northern Pacific, Great Northern, Soo Line.
Tracks at elevator:	
Number	4.
Capacity, cars	14 cars each, total 56 cars.
Supporting yards:	
Number	Railroad inspection yards of Northern Pacific.
Distance from elevator	Soo adjacent to house track.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	1
Owner	Globe Elevator Co.
Operator	Same.
Exact location	Wisconsin side St. Louis Bay, foot of Banks Avenue slip and east of Northern Pacific Ry., Rice's Point Bridge.
Type of construction	Woodworking house.
Use	Public elevator.
Depth of water in berth (feet)	19–21.
Storage capacity, bushels:	
Maximum	800,000.
Normal operating capacity	60 to 80 cars unloading, 10 hours.
Number of bins	153.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	8,000–10,000.
Elevator to ship	50,000–60,000.
Ship to elevator	6,000.
Elevator to car	5,000–6,000.
Equipment for loading and unloading	Usual elevator equipment for cars and to boat. Small marine leg for unloading boats.
Name of railroad connecting	Chicago and Northwestern Ry.
Tracks at elevator:	
Number	3.
Capacity, cars	18.
Supporting yards:	
Number	1.
Distance from elevator	3 to 400 feet.
Capacity, cars	About 100.

Name or number	2
Owner	Globe Elevator Co.
Operator	Same.
Exact location	Wisconsin side of St. Louis Bay, foot of Banks Avenue slip and east of Northern Pacific Ry., Rice's Point Bridge.
Type of construction	Wood; crib construction.
Use	Storage.
Depth of water in berth	No slip.
Storage capacity, bushels:	
Maximum	1,850,000.
Number of bins	78.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	1 carrier belt capacity about 25,000.
Equipment for loading and unloading	None; storage only.
Name of railroad connecting	Chicago & Northwestern Ry.
Tracks at elevator:	
Number	3.
Capacity, cars	18.
Supporting yards:	
Number	1.
Distance from elevator (feet)	3–400.
Capacity, cars	About 100.

Name or number	3
Owner	Globe Elevator Co.
Operator	Same.
Exact location	Wisconsin side of St. Louis Bay, foot of Banks Avenue Slip and east of Northern Pacific Ry., Rice's Point Bridge.
Type of construction	Wood; crib construction.
Depth of water in berth	No slip.
Storage capacity, bushels:	
Maximum	1,850,000.
Normal operating capacity	30 to 40 cars unloading 10 hours.
Number of bins	80.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	About 4,000.
Elevator to car	Do.
Equipment for loading and unloading	Usual elevator equipment.
Name of railroad connecting	Chicago & Northwestern Ry.
Tracks at elevator:	
Number	2.
Capacity, cars	12 for loads; 75 to 100 for empties.
Supporting yards:	
Number	1.
Distance from elevator	About 1,200 feet.
Capacity, cars	Unknown.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	Itasca
Owner	Itasca Elevator Co., on ground leased from C., St. P., M. & O. Ry.
Operator	Same.
Exact location	Allouez Bay, east of Pittsburgh coal dock No. 5, occupying 630 feet of westerly side of C., St. P., M. & O. Ry. dock.
Type of construction	Frame and concrete.
Use	Private.
Depth of water in berth (feet)	19–22.
Storage capacity, bushels:	
Maximum	2,400,000.
Normal operating capacity	2,100,000.
Number of bins	233.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	15,000.
Elevator to ship	40,000.
Ship to elevator	No facilities.
Elevator to car	9,000.
Equipment for loading and unloading	18 1,000-bushel scales for unloading from cars; 6 power shovels; for loading, 10 loading spouts.
Name of railroad connecting	Chicago & Northwestern Ry.
Tracks at elevator:	
Number	2.
Capacity, cars	12 cars in unloading shed.
Supporting yards:	
Number	1.
Distance from elevator	½ mile.
Capacity, cars	120.

Name or number	S and annex		
Owner	Great Northern Ry.		
Operator	A. D. Thomson & Co.		
Exact location	Wisconsin side of St. Louis Bay and on east side of first slip west of Northern Pacific Ry. Bridge, Rice's Point.		
Type of construction	Steel workhouse, concrete storage house.		
Use	Private.		
Depth of water in berth (feet)	22–24.		
Storage capacity, bushels:	"S"	Annex	Annex
Maximum	3,250,000	2,250,000	3,000,000
Number of bins	550	123	239
Normal loading and unloading capacity, bushels per hour:			
Car to elevator	34,000	45,000	45,000
Elevator to ship	100,000	100,000	35,000
Elevator to car	3 cars loaded at once in 5 minutes.		
Equipment for loading and unloading	9 receiving scales, 9 shipping scales, 16 spouts, 3 car-loading spouts, 18 power shovels.		
Other equipment	32 wheat cleaners, 10 flax cleaners, 2 double screening cleaners, 3 Carter disk cleaners (remove wheat from oats), 2 oat clippers, 1 oat scalper; not used.		
Name of railroad connecting	Great Northern Ry.		
Tracks at elevator:			
Number	2.		
Capacity, cars	18.		
Supporting yards:			
Number	1.		
Distance from elevator	Adjacent.		
Capacity, cars	340.		

Name or number	"X"
Owner	Great Northern Ry.
Operator	A. D. Thomson & Co.
Exact location	Wisconsin side St. Louis Bay and on east side of first slip west of Northern Pacific Railway Bridge, Rice's Point.
Type of construction	Frame and corrugated iron.
Use	Private.
Depth of water in berth (feet)	22–24.
Storage capacity, bushels:	
Maximum	1,500,000.
Normal operating capacity	Same.
Number of bins	132.
Normal loading and unloading capacity:	
Car to elevator	40 cars in 10 hours.
Equipment for loading and unloading	4 power shovels.
Name of railroad connecting	Great Northern Ry.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	Kellogg
Owner	Spencer Kellogg & Sons. (Inc.)
Iperator	Same.
Exact location	Foot of Dock Street and west side of Hughitt slip.
Type of construction	Frame, brick, and concrete.
Depth of water in berth (feet)	16–19.
Storage capacity, bushels:	
Maximum	750,000 storage tanks and workhouse.
Normal operating capacity	500,000.
Number of bins	59.
Normal loading and unloading capacity:	
Car to elevator	40 cars 10-hour day.
Ship to elevator	5,000 bushels per hour.
Elevator to car	20 cars a day, depending on grain.
Equipment for loading and unloading	1 marine leg with 20-inch belt; 1 rig with 2 power shovels; 3 shipping scales, 1,500 bushels per hour.
Other equipment	3 lofters, 20-inch belts. 4 flax cleaners, 4 scalpers, 1 oat clipper.
Name of railroad connecting	Terminal tracks.
Tracks at elevator:	
Number	2.
Capacity cars	19.
Supporting yards	None.

Name or number	"K"
Owner	Cargill Grain Co.
Operator	Same.
Exact location	Superior Bay, foot of St. John Avenue.
Type of construction	Frame and crib with galvanized iron.
Use	Private.
Depth of water in berth (feet)	20–25.
Storage capacity, bushels:	
Maximum	650,000.
Normal operating capacity	400,000.
Number of bins	140.
Normal loading and unloading capacity, (per hour):	
Car to elevator	80 cars in 10 hours.
Elevator to ship	40,000 bushels.
Elevator to car	7 cars at once, 6 minutes to a car.
Equipment for loading and unloading	12 power shovels, 8 unloading legs, belt conveyors, 8 scales.
Other equipment	25 cleaners.
Name of railroad connecting	Northern Pacific Ry. Co.
Tracks at elevator:	
Number	3.
Capacity, cars	68.
Supporting yards	None.

Name or number	"L"
Owner	Cargill Grain Co.
Operator	Same.
Exact location	Superior Bay, foot of St. John Avenue.
Type of construction	Frame and crib with galvanized iron
Use	Private.
Depth of water in berth (feet)	20–25.
Storage capacity, bushels:	
Maximum	1,600,000.
Normal operating capacity	Same.
Number of bins	48.
Equipment for loading and unloading	1 hoisting leg, 36-inch belt conveyor from Elevator "K" to storage house.
Name of railroad connecting	Northern Pacific Ry. Co.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	"M"
Owner	Cargill Grain Co.
Operator	Same.
Exact location	Superior Bay, foot of Hollinshead Avenue.
Type of construction	Frame and crib with corrugated iron.
Use	Private.
Depth of water in berth (feet)	20–25.
Storage capacity, bushels:	
Maximum	450,000.
Normal operating capacity	Same.
Number of bins	70 (45 days).
Normal loading and unloading capacity, (per hour):	
Car to elevator	60 cars in 10 hours.
Elevator to ship	30,000 bushels.
Elevator to car	13 cars per hour, using 4 loaders.
Equipment for loading and unloading	2 shipping legs, 2 receiving legs; 30-inch belts under pits to legs, 8 power shovels, 6 scales, 72,000 pounds.
Other equipment	17 cleaners; 2 clippers.
Name of railroad connecting	Northern Pacific Ry. Co.
Tracks at elevator:	
Number	4.
Capacity, cars	75.
Supporting yards	None.
Remarks	Workhouse for storage house "N". Connected by belt conveyors.

Name or number	"N"
Owner	Cargill Grain Co.
Operator	Same.
Exact location	Superior Bay, foot of Hollinshead Avenue.
Type of construction	Frame and crib with corrugated iron.
Use	Private.
Depth of water in berth (feet)	20–25.
Storage capacity, bushels:	
Maximum	2,225,000.
Normal operating capacity	Same.
Number of bins	81.
Name of railroad connecting	Northern Pacific Ry. Co.

Name or number	Lake Superior and Listman
Owner	Duluth-Superior Milling Co.[1]
Operator	Same.
Exact location	Superior Bay, foot of Nettleton Avenue.
Type of construction	2 frame and 1 concrete.
Depth of water in berth (feet)	17–22.
Storage capacity, bushels:	
Maximum	Lake Superior 750,000 Listman 100,000.
Normal operating capacity	Lake Superior 760,000 Listman 96,000.
Number of bins	Lake Superior 86 Listman 24.
Normal loading and unloading capacity, (per hour):	
Car to elevator	Daisy 4,000 bushels. Listman 1,400 bushels.
Elevator to ship	None. None.
Ship to elevator	None. None.
Elevator to car	Daisy 4,000 bushels. Listman 1,400 bushels.
Elevator to barge or lighter	None. None.
Other equipment	Power shovels are used in unloading at both elevators. In loading cars, the grain is conveyed to cars direct from scales by iron spouts.
Name of railroad connecting	Northern Pacific Ry.
Tracks at elevator:	
Number	One track at each elevator.
Capacity, cars	Daisy 30 cars, Listman 15 cars.
Supporting yards	None.

[1] Owner, Standard Milling Co., leased to Duluth-Superior Milling Co.

TABLE No. 130.—*Port of Duluth'Superior*—Continued

Name or number	Peavey Duluth terminal
Owner	Peavy Duluth Terminal Co.
Operator	Same.
Exact location	East side of Rice's Point, between Elm and Lynn Avenues.
Type of construction	Concrete storehouse; tile and concrete shipping house
Use	Public.
Depth of water in berth (feet)	20–23
Storage capacity, bushels:	
Maximum	4,000,000.
Normal operating capacity	110 to 130 cars unloading 10 hours.
Number of bins	172.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	18,000.
Elevator to ship	60,000.
Ship to elevator	No marine leg.
Elevator to car	6,000.
Equipment for loading and unloading	Usual elevator equipment for cars and to boat.
Name of railroads connecting	Northern Pacific, Great Northern, Soo. Arrangement Northern Pacific for Omaha switch.
Tracks at elevator:	
Number	3.
Capacity, cars	36.
Supporting yards:	
Number	None; use trackage of connecting railroads.
Distance from elevator	
Capacity, cars	

Name or number	Duluth Universal Milling Co.
Owner	Duluth Universal Milling Co.
Operator	Same.
Exact location	Twelfth Avenue West and Railroad Street.
Type of construction	Wood and timber with galvanized iron.
Use	Private.
Depth of water in berth	None.
Storage capacity, bushels:	
Maximum	25,000.
Normal operating capacity	
Number of bins	11.
Normal loading and unloading capacity, bushels per hour: Car to elevator	400.
Equipment for loading and unloading	1 power shovel; 1 scale, 400 bushels capacity.
Other equipment	3 flour packers; 4 feed packers.
Name of railroads connecting	Joint tracks all roads. Milwaukee cars handled by Northern Pacific.
Tracks at elevator:	
Number	2.
Capacity, cars	24–30.
Supporting yards: Number	None.

Name or number	4
Owner	Capitol Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, south of Birch Avenue.
Type of construction	Wood.
Use	Working house, public.
Depth of water in berth	20–23 feet.
Storage capacity, bushels:	
Maximum	900,000.
Normal operating capacity	700,000.
Number of bins	104.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	6,000.
Elevator to ship	35,000.
Ship to elevator	20,000.
Elevator to car	4,000.
Equipment for loading and unloading	1 marine leg, 20,000 per hour; 3 loading spouts to cars; 5 loading spouts to vessels; 2 receiving pits from cars to elevator.
Other equipment	Cleaners.
Name of railroads connecting	Northern Pacific, Soo, and Great Northern.
Tracks at elevator:	
Number	1.
Capacity, cars	9.
Supporting yards:	
Number	2.
Distance from elevator	Varies.
Capacity, cars	Unknown.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	5
Owner	Capitol Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, south of Birch Avenue.
Type of construction	Wood.
Use	Annex, public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	600,000.
Normal operating capacity	450,000.
Number of bins	81.
Name of railroads connecting	Northern Pacific, Soo, and Great Northern.

Name or number	6
Owner	Capitol Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, south of Birch Avenue.
Type of construction	Concrete and steel.
Use	Working house, public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	750,000.
Normal operating capacity	600,000.
Number of bins	55 bins, 22 pockets, 40 intermediate bins.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	15,000.
Elevator to ship	80,000.
Elevator to car	7,000.
Equipment for loading and unloading	5 loading spouts to boats; 3 loading spouts to cars; 3 receiving pits; cars to elevator.
Other equipment	Cleaners.
Name of railroads connecting	Northern Pacific, Soo, and Great Northern.
Tracks at elevator:	
Number	4.
Capacity, cars	12 in unloading shed.
Supporting yards:	
Number	2.
Distance from elevator	Varies.
Capacity, cars	Unknown.

Name or number	7
Owner	Capitol Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, south of Birch Avenue.
Type of construction	Concrete.
Use	Annex, public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	1,000,000.
Normal operating capacity	1,000,000.
Number of bins	67.
Name of railroad connecting	Northern Pacific, Soo, and Great Northern.

PEAVEY GRAIN ELEVATOR, DULUTH-SUPERIOR HARBOR (CAPACITY, 4,000,000 BUSHELS)

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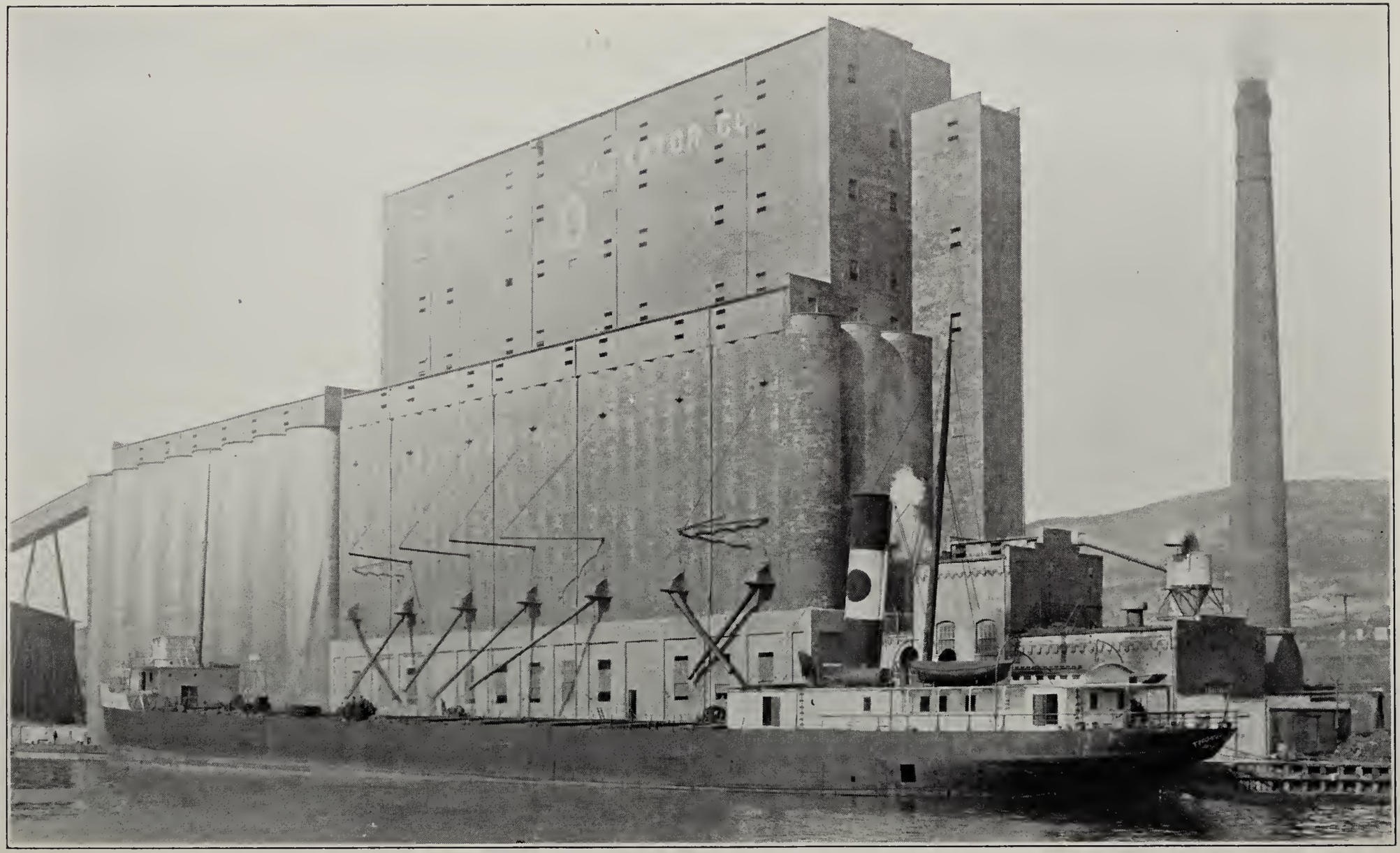

ELEVATOR D, CONSOLIDATED ELEVATOR CO., DULUTH-SUPERIOR (CAPACITY, 2,300,000 BUSHELS)

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	B
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point and south of bay front slip.
Type of construction	Wood, metal covered.
Use	Grain handling and storage; private.
Depth of water in berth (feet)	19–22.
Storage capacity, bushels:	
Maximum	1,000,000.
Normal operating capacity	800,000.
Number of bins	175.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	12,500.
Elevator to ship	40,000.
Elevator to car	10,000.
Equipment for loading and unloading	10 receiving elevators; 8 shipping elevators; 18 Fairbanks hopper scales, 700 bushels capacity; 20 Clark shovels; 12 loading spouts.
Other equipment	10 grain-cleaning machines, 10,000 bushels capacity per hour.
Name of railroad connecting	Northern Pacific, Great Northern, Omaha, and Soo switch.
Tracks at elevator:	
Number	2 through the house.
Capacity, cars	30.

Name or number	C
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point and south of bay front slip.
Type of construction	Wood, metal covered.
Use	Private.
Depth of water in berth (feet)	19–22.
Storage capacity, bushels:	
Maximum	1,200,000.
Normal operating capacity	1,000,000.
Number of bins	180.
Normal loading and unloading capacity, bushels per hour:	Storage only, annex to Elevator "B."
Car to elevator	Horizontal conveyor belt at top from main house for loading storage.
Elevator to ship	Horizontal conveyor belt at bottom for emptying storage into main house.
Name of railroad connecting	Northern Pacific, Great Northern, Omaha, and Soo switch.

Name or number	D
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point and south of bay front slip.
Type of construction	Reinforced tile and concrete.
Use	Public.
Depth of water in berth (feet)	19–22.
Storage capacity, bushels:	
Maximum	2,300,000.
Normal operating capacity	2,000,000.
Number of bins	160.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	15,000.
Elevator to ship	50,000.
Equipment for loading and unloading	4 receiving elevator legs, 10,000 bushels per hour each; 4 shipping elevator legs, 15,000 bushels per hour each; 4 cleaning elevator legs, 10,000 bushels; 8 Fairbanks hopper scales, 1,400 bushels capacity; 20 cleaning machines; 24 Clark shovels; 7 loading spouts.
Name of railroad connecting	Northern Pacific, Great Northern, Omaha, and Soo switch.
Tracks at elevator:	
Number	3 tracks through the house.
Capacity, cars	48.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	G
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point and south of bay front slip.
Type of construction	Wood, metal covered.
Use	Public.
Depth of water in berth (feet)	19–22.
Storage capacity, bushels:	
Maximum	1,600,000.
Normal operating capacity	1,500,000.
Number of bins	44.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	Storage only, annex to Elevator "D."
Elevator to ship	Horizontal conveyor belt at top from main house for loading storage, 10,000 bushels.
Ship to elevator	Horizontal conveyor belt at bottom, capacity 15,000 bushels per hour, for emptying storage into main house.
Name of railroad connecting	Northern Pacific, Great Northern, Omaha, and Soo switch.

Name or number	E
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, about 400 feet northwest from Ash Avenue.
Type of construction	Wood, metal covered.
Use	Public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	1,300,000.
Normal operating capacity	1,000,000.
Number of bins	180.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	20,000.
Elevator to ship	60,000.
Ship to elevator	20,000.
Elevator to car	15,000.
Equipment for loading and unloading	8 receiving elevators, 10,000 bushels capacity per hour; 9 shipping elevators, 8,000 bushels capacity per hour; 17 Fairbanks hopper scales, 1,400 bushels capacity; 20 cleaning machines; 18 Clark shovels; 14 loading spouts.
Name of railroad connecting	All roads free entry, Northern Pacific, Great Northern, Omaha, and Soo.
Tracks at elevator:	
Number	2.
Capacity, cars	8 cars each.

Name or number	F
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, about 400 feet northwest from Ash Avenue.
Type of construction	Wood, metal covered.
Use	Public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	1,400,000.
Normal operating capacity	1,200,000.
Number of bins	38.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	Storage only, annex to Elevator "E."
Elevator to ship	Hortizontal conveyor belt at top, 10,000 bushels capacity per hour for loading storage.
Ship to elevator	Horizontal conveyor belt at bottom to main house, 15,000 bushels capacity per hour.
Name of railroad connecting	All roads free entry, Northern Pacific, Great Northern, Omaha, and Soo.

TABLE No. 130.—*Port of Duluth-Superior*—Continued

Name or number	H
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, about 400 feet northwest from Ash Avenue.
Type of construction	Wood, metal covered.
Use	Public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	1,200,000.
Normal operating capacity	1,000,000.
Number of bins	180.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	15,000.
Elevator to ship	50,000.
Elevator to car	10,000.
Equipment for loading and unloading	9 receiving elevators, 10,000 bushels capacity per hour; 9 shipping elevators, 10,000 bushels capacity per hour; 18 cleaning machines; 24 Clark shovels; 12 loading spouts.
Name of railroad connecting	All roads free entry, Northern Pacific, Great Northern, Omaha, and Soo.
Tracks at elevator:	
Number	2.
Capacity, cars	16 cars each.

Name or number	I
Owner	Consolidated Elevator Co.
Operator	Same.
Exact location	East side of Rice's Point, about 400 feet northwest from Ash Avenue.
Type of construction	Reinforced concrete.
Use	Public.
Depth of water in berth (feet)	20–23.
Storage capacity, bushels:	
Maximum	1,250,000.
Normal operating capacity	1,000,000.
Number of bins	90.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	Storage annex to Elevator "H."
Elevator to ship	2 horizontal conveyor belts at top from the main house for filling storage.
Ship to elevator	3 horizontal conveyor belts at bottom for emptying house to 3 shipping elevators, capacity 15,000 bushels each per hour.
Equipment for loading and unloading	3 Fairbanks hopper scales, 1,000 bushels capacity; 4 loading spouts.
Name of railroad connecting	All roads free entry, Northern Pacific, Great Northern, Omaha, and Soo.

MILWAUKEE, WIS.

Milwaukee is located on the west shore of Lake Michigan at the mouth of the Milwaukee River, about 85 miles north of Chicago. The grain-handling facilities consist of 15 privately owned and 3 public transfer elevators. Practically all of the privately owned elevators are located inland and are used in connection with the manufacture of grain products. The two public elevators owned by the Chicago & Northwestern Railway Co. are operated by the Donahue-Stratton Co. One, the Rialto, located on the right bank of the Milwaukee River at the foot of Pittsburgh Avenue is of 1,700,000 bushels capacity, and the other, the Kinnickinnic, located on the left bank of the Kinnickinnic River basin, is of 1,250,000 bushels. The

Chicago & Northwestern Railway serves these elevators, and car storage yards are near-by. The public elevator owned by the Chicago, Milwaukee, St. Paul & Pacific Railroad Co. and operated by the Cargill Grain Co., is of 1,250,000 bushels capacity and is located on the right bank of the South Menomonee Canal at the foot of Sixth Avenue extended. The Chicago, Milwaukee, St. Paul & Pacific Railroad serves this elevator, and car storage yards are adjacent. A detailed description of the elevators at Milwaukee is given in the following tables:

GRAIN ELEVATORS

TABLE NO. 131.—*Port of Milwaukee, Wis.*

Name or number	Kinnickinnic
Owner	Chicago & Northwestern Ry. Co.
Operator	Donahue-Stratton Co.
Exact location	Left bank of Kinnickinnic River basin.
Type of construction	Concrete.
Use	Public.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	1,250,000.
Normal operating capacity	1,000,000.
Number of bins	210.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	16,000.
Elevator to ship	60,000.
Elevator to car	25,000.
Elevator to barge or lighter	60,000.
Equipment for loading and unloading	12 unloading machines, 12 car pits, 3 car-loading spouts, 6 vessel-loading spouts, hopper scales.
Other equipment (cleaning, drying, etc.)	Cleaners, clippers, mixer, sacker, and drier.
Name of railroad connecting	Chicago & Northwestern.
Tracks at elevator:	
Number	6.
Capacity, cars	200.
Supporting yards:	
Number	1.
Distance from elevator	Adjacent.
Capacity, cars	400.

Name or number	Rialto
Owner	Chicago & Northwestern Ry. Co.
Operator	Donahue-Stratton Co.
Exact location	Foot of Pittsburgh Avenue, on right bank of Milwaukee River.
Type of construction	Wood, concrete tanks.
Use	Public.
Depth of water in berth (feet)	20.
Storage capacity, bushels:	
Maximum	1,700,000.
Normal operating capacity	1,100,000.
Number of bins	143.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to ship	40,000.
Ship to elevator	5,000.
Elevator to car	10,000.
Elevator to barge or lighter	40,000.
Equipment for loading and unloading	8 receiving legs, power shovels, 4 car-loading spouts, 4 vessel-loading spouts, hopper scales.
Other equipment (cleaning, drying, etc.)	Cleaners, clippers and scourers. Automatic sacking scales and drier.
Name of railroad connecting	Chicago & Northwestern.
Tracks at elevator:	
Number	2.
Capacity, cars	15.
Supporting yards:	
Number	1.
Distance from elevator	¼ mile.
Capacity, cars	500.

CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC R. R. ELEVATOR E, MILWAUKEE, WIS. (CAPACITY, 1,250,000 BUSHELS)

TABLE No. 131.—*Port of Milwaukee, Wis.*—Continued

Name or number	"E"
Owner	Chicago, Milwaukee, St. Paul & Pacific Railroad Co.
Operator	Cargill Grain Co.
Exact location	Foot of Sixth Avenue extended, on right bank of South Menomonee Canal.
Type of construction	Concrete.
Use	Public.
Depth of water in berth (feet)	22.
Storage capacity, bushels:	
Maximum	1,250,000.
Normal operating capacity	1,000,000.
Number of bins	112.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,500.
Elevator to ship	50,000,
Elevator to car	20,000.
Elevator to barge or lighter	50,000.
Equipment for loading and unloading	4 unloading power shovels, 4 car pits, 3 car-loading spouts, 4 vessel-loading spouts.
Other equipment	Driers, cleaners, and clippers.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific
Tracks at elevator:	
Number	3.
Capacity, cars	15.
Supporting yards:	
Number	1.
Distance from elevator	Adjacent.
Capacity, cars	1,500.

Name or number	Krause
Owner	Krause Milling Co.
Operator	Do.
Exact location	Thirty-seventh and Burnham.
Type of construction	Steel, brick, and concrete.
Use	Private.
Storage capacity, bushels:	
Maximum	200,000.
Normal operating capacity	150,000.
Number of bins	45.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,500.
Equipment for loading and unloading	Bucket conveyor. Track scales.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific; Chicago & North Western. (Belt Line.)
Tracks at elevator:	
Number	3.
Capacity, cars	18.

Name or number	Atlas
Owner	Bernhard Stern & Sons.
Operator	Donahue-Stratton Co.
Exact location	Foot of Cherry Street.
Type of construction	Tile and brick.
Use	Private.
Depth of water in berth (feet)	Not on waterfront.
Storage capacity, bushels:	
Maximum	500,000.
Number of bins	28.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000.
Elevator to car	2,000.
Equipment for loading and unloading	Bucket elevator. Loading spout.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific.
Tracks at elevator:	
Number	2.
Capacity, cars	20.

TABLE No. 131.—*Port of Milwaukee, Wis.*—Continued

Name or number	Kurth
Owner	Kurth Malting Co.
Operator	Do.
Exact location	Thirty-seventh south of Burnham.
Type of construction	Concrete.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	1,380,000.
Normal operating capacity	1,000,000.
Number of bins	58.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,500.
Elevator to car	5,000.
Equipment for loading and unloading	Bucket elevator. Track scale. Hopper scale.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific; Chicago, North Western. (Belt Line.)
Tracks at elevator:	
Number	3.
Capacity, cars	20.

Name or number	Kamm
Owner	Kamm & Co.
Operator	Do.
Exact location	Thirty-seventh and Greenfield.
Type of construction	Concrete.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	250,000.
Normal operating capacity	200,000.
Number of bins	38.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,000.
Elevator to car	3,000.
Equipment for loading and unloading	Receiving and shipping legs. Hopper scales.
Other equipment	Oat clipper, cleaner, disk separators.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific; Chicago & North Western. (Belt Line.)
Tracks at elevator:	
Number	3.
Capacity, cars	36.

Name or number	Corcoran
Owner	Corcoran Bros. Co.
Operator	Do.
Exact location	108 Jefferson Street.
Type of construction	Frame: covered with iron.
Use	Private.
Storage capacity, bushels:	
Maximum	30,000.
Normal operating capacity	10,000.
Number of bins	10.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	300.
Equipment for loading and unloading	Track scale, bucket conveyor.
Other equipment	1 oats cleaner.
Name of railroad connecting	Chicago & North Western.
Tracks at elevator:	
Number	1.
Capacity, cars	1.

TABLE No. 131.—*Port of Milwaukee, Wis.*—Continued

Name or number	Schlitz
Owner	Joseph Schlitz Beverage Co.
Operator	Do.
Exact location	Second and Cherry Streets.
Type of construction.	Tile.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	600,000.
Normal operating capacity	100,000.
Number of bins	45.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	700.
Elevator to car	700.
Equipment for loading and unloading	Track scale, bucket conveyor.
Other equipment	1 duster and cleaner.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific.
Tracks at elevator:	
Number	1.
Capacity, cars	1.

Name or number	Pabst
Owner	Pabst Corp.
Operator	Do.
Exact location	917 Chestnut Street.
Type of construction	Frame, sheet-iron covering.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	500,000.
Number of bins	40.
Equipment for loading and unloading	Bucket conveyor.

Name or number	Riebs Malt House
Owner	The Riebs Co.
Operator	Do.
Exact location	Twenty-fourth Avenue and South Pierce.
Type of construction	Masonry and frame, covered with iron.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	600,000.
Normal operating capacity	350,000.
Number of bins	40.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,500.
Elevator to car	1,500.
Equipment for loading and unloading	1 loading spout, 1 power shovel, track scale, hopper scale.
Other equipment	Screener, clipper, and drying.
Name of railroad conecting	Chicago, Milwaukee, St. Paul & Pacific.
Tracks to elevator:	
Capacity, cars	1.

Name or number	Riebs Elevator
Owner	The Riebs Co.
Operator	Do.
Exact location	Right bank of Milwaukee River; Commerce Street.
Type of construction	Frame, covered with iron.
Use	Private.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	200,000.
Normal operating capacity	150,000.
Number of bins	40.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,000.
Elevator to car	3,000.
Equipment for loading and unloading	2 power shovels, 1 loading spout, track scale, hopper scale.
Other equipment (cleaning, drying, etc.)	Drier, screener, and clipping machine.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific.
Tracks at elevator:	
Number	2.
Capacity, cars	11.

TABLE No. 131.—*Port of Milwaukee, Wis.*—Continued

Name or number	Milwaukee Western Malt Co.
Owner	Milwaukee Western Malt Co.
Operator	Do.
Exact location	South Water Street, right bank of Milwaukee River.
Type of construction	Frame; covered with iron.
Use	Private.
Depth of water in berth (feet)	20 feet.
Storage capacity, bushels:	
Maximum	430,000.
Normal operating capacity	350,000.
Number of bins	100.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,500.
Elevator to car	2,000.
Equipment for loading and unloading	3 power shovels, 2 track scales, 6 hopper scales.
Other equipment (cleaning, drying, etc.)	4 automatic bagging scales. Malt and barley cleaning machines.
Tracks at elevator:	
Number	2.
Capacity, cars	6.

Name or number	Calumet
Owner	Froedtert Grain & Malting Co.
Operator	Do.
Exact location	Thirty-third and Grant.
Type of construction	Concrete.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	1,200,000.
Normal operating capacity	850,000.
Number of bins	60.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	4,000-5,000.
Elevator to car	5,000.
Equipment for loading and unloading	2 loading spouts, 1 car pit, 1 bucket conveyor, 1 track scale, 1 loading hopper scale.
Other equipment	5 cleaners, 1 clipper, 1 sacker, 1 bleacher.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific; Chicago & Northwestern (belt line).
Tracks at elevator:	
Number	3.
Capacity, cars	50.

Name or number	Weschler
Owner	D. D. Weschler & Sons.
Operator	Do.
Exact location	Thirty-seventh Street, south of Burnham Street.
Type of construction	Concrete.
Use	Private.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	570,000.
Number of bins	60.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,500.
Elevator to car	16,000.
Equipment for loading and unloading	Track scales, hopper scales, spouts.
Other equipment	Cleaning, sacking, and drying.
Name of railroad connecting	Chicago, Milwaukee, St. Paul; & Pacific Chicago & Northwestern (belt line).
Tracks at elevator:	
Number	3.
Capacity, cars	20.

TABLE No. 131.—*Port of Milwaukee, Wis.*—Continued

Name or number	Smith
Owner	Smith Milling Co.
Operator	Do.
Exact location	Thirty-sixth and Lincoln.
Type of construction	Concrete.
Use	Private.
Storage capacity, bushels:	
Maximum	60,000.
Normal operating capacity	50,000.
Number of bins	35.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,500.
Equipment for loading and unloading	Bucket elevator, track scale, hopper scale.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific; Chicago & North western.
Tracks at elevator:	
Number	1.
Capacity, cars	12.

Name or number	Ladish
Owner	Ladish Milling Co.
Operator	Do.
Exact location	Thirty-sixth and National.
Type of construction	Concrete.
Use	Private.
Storage capacity, bushels:	
Maximum	100,000.
Normal operating capacity	90,000.
Number of bins	33.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,500.
Elevator to car	2,500.
Equipment for loading and unloading	Loading spout, track scale, hopper scale, bucket elevator.
Other equipment	Cleaner, disk separator.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific; Chicago & Northwestern.
Tracks at elevator:	
Number	2.
Capacity, cars	18.

Name or number	Hales
Owner	Hales Milling Co.
Operator	Do.
Exact location	First Avenue on right bank of South Menomonee Canal.
Type of construction	Frame, covered with iron.
Use	Private.
Depth of water in berth (feet)	20.
Storage capacity, bushels:	
Maximum	100,000.
Normal operating capacity	60,000.
Number of bins	30.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	750.
Elevator to car	750.
Equipment for loading and unloading	Power shovel, bucket elevator, hopper scale, loading spout.
Other equipment	Cleaner and separator.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific.
Tracks at elevator:	
Number	2.
Capacity, cars	6.

MANITOWOC, WIS.

This port is situated on the west shore of Lake Michigan at the mouth of the Manitowoc River, approximately 76 miles northerly from Milwaukee. The Bartlett Fraser Co. owns and operates two water-front transfer elevators, one of 700,000 bushels capacity and the other of 1,700,000 bushels. The former, Elevator A, is located at the foot of Buffalo Street, and the latter, Elevator B, at South Water and Twelfth Streets.

Elevator A has the necessary equipment for cleaning, drying, and sacking grain. Cars are loaded at the rate of 8,000 bushels and unloaded at the rate of 4,000 bushels per hour, while vessels are loaded at a normal rate of 20,000 bushels per hour. There are two tracks of 10 cars capacity at the elevator, served by the Soo Line.

Elevator B is also equipped to clean, dry, and sack grain. Cars are loaded and unloaded at a normal speed of 16,000 and 10,000 bushels per hour, respectively. Vessels are loaded at the rate of 25,000 bushels and unloaded at the rate of 4,000 bushels per hour. The Chicago & North Western Railway serves this elevator over two tracks, with capacity of 34 cars. A supporting yard of 72 cars capacity is near by.

GRAIN ELEVATORS

TABLE NO. 132.—*Port of Manitowoc, Wis.*

Name or number	Bartlett Frazer Co. "A."
Owner	Bartlett Frazer Co.
Operator	Do.
Exact location	North side of River Street, foot of Buffalo Street.
Type of construction	Timber and iron.
Use	Public.
Depth of water in berth (feet)	18½.
Storage capacity, bushels:	
Maximum	700,000.
Normal operating capacity	600,000.
Number of bins	57.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	4,000.
Elevator to ship	20,000.
Elevator to car	8,000.
Equipment for loading and unloading	Power shovels, 4 shipping spouts, 4 Howe scales, 4 shipping scales, 2 receiving scales.
Other equipment (cleaning, drying, etc.)	1 dryer, 3 cleaners, 2 clippers.
Name of railroad connecting	Soo Line.
Tracks at elevator:	
Number	2.
Capacity, cars	10.

TABLE No. 132.—*Port of Manitowoc, Wis.*—Continued

Name or number	Bartlett Frazer Co. "B."
Owner	Bartlett Frazer Co.
Operator	Do.
Exact location	South Water and Twelfth Streets.
Type of construction	Timber and iron.
Use	Public.
Depth of water in berth (feet)	18½.
Storage capacity, bushels:	
Maximum	1,700,000.
Normal operating capacity	1,500,000.
Number of bins	140.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to ship	25,000.
Ship to elevator	4,000.
Elevator to car	16,000.
Equipment for loading and unloading	Power shovels, 4 loading spouts, 1 marine leg, 4 Fairbanks receiving scales, 5 Fairbanks shipping scales.
Other equipment (cleaning, drying, etc.)	1 Haas dryer, 7 cleaners, 2 clippers, 1 automatic sacking machine, 1,000 bushels per hour.
Name of railroad connecting	Chicago & North Western.
Tracks at elevator:	
Number	2.
Capacity, cars	34.
Supporting yards:	
Distance from elevator	Adjacent.
Capacity, cars	72.

GREEN BAY, WIS.

This port is located at the mouth of the Fox River at the head of Green Bay, distant about 180 miles northerly from Milwaukee, Wis., via Sturgeon Bay Canal. The Chicago & North Western Railway Co., and the Green Bay & Western Railroad Co. own public elevators, both operated by the Gargill Grain Co. The former is of 500,000 bushels capacity and the latter 800,000 bushels. The C. & N. W. elevator is located on the left bank of Fox River below Main Street bridge. The G. B. & W. elevator is located at Green Junction and is not on the water front. The railroads serve their respective elevators and each have car storage yards adjacent. A detailed description of the elevators at Green Bay is given in the following tables:

GRAIN ELEVATORS

TABLE No. 133.—*Port of Green Bay, Wis.*

Name or number	"A"
Owner	Green Bay & Western R. R.
Operator	Cargill Grain Co.
Exact location	Green Bay Junction.
Type of construction	Concrete.
Use	Public.
Depth of water in berth (feet)	Not on water front.
Storage capacity, bushels:	
Maximum	800,000.
Normal operating capacity	750,000.
Number of bins	46.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	6,000.
Elevator to car	8,000.
Equipment for loading and unloading	2 unloading power shovels, 2 car-loading spouts, 2 car pits.
Other equipment	Clipper, dryer, purifier.
Name of railroad connecting	Green Bay & Western.
Tracks at elevator:	
Number	2.
Capacity, cars	24.
Supporting yards:	
Number	1.
Distance from elevator	Adjacent.
Capacity, cars	300.

TABLE NO. 133.—*Port of Green Bay, Wis.*—Continued

Name or number	"B"
Owner	Chicago & Northwestern Ry. Co.
Operator	Cargill Grain Co.
Exact location	Left bank Fox River.
Type of construction	Concrete.
Use	Public.
Depth of water in berth (feet)	22.
Storage capacity, bushels:	
Maximum	500,000.
Normal operating capacity	400,000.
Number of bins	24.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	14,000.
Elevator to ship	30,000.
Elevator to car	20,000.
Elevator to barge or lighter	30,000.
Equipment for loading and unloading	4 unloading power shovels, 4 car pits, 2 car-loading spouts, 2 vessel-loading spouts.
Other equipment	Cleaner and clipper.
Name of railroad connecting	Chicago & Northwestern.
Tracks at elevator:	
Number	2.
Capacity, cars	24.
Supporting yards:	
Number	1.
Distance from elevator	Adjacent.
Capacity	500.

CHICAGO, ILL.

Chicago is located on the southwestern extremity of Lake Michigan at the mouth of the Chicago River. This port is served by many trunk-line railroads and by numerous fleets operating on the Great Lakes; consequently it has become the largest grain collecting and distributing market in the United States. Every year many million bushels of rail-borne grain funnel into Chicago to be shipped out by water to various lower lake ports, or to be reconsigned to various interior and coastal points.

In general the grain-handling facilities consist of 42 elevators, with a combined maximum storage capacity of approximately 48,000,000 bushels. The following shows the combined storage and machinery capacities of the elevators at Chicago:

Number of elevators	Storage capacity (bushels)	Machinery capacity, bushels per hour			
		Car to elevator	Ship to elevator	Elevator to ship	Elevator to car
42	47,658,000	379,700	100,800	832,000	617,200

Of the 42 elevators, 9 are located along the banks of Chicago River, and 13 on Calumet Harbor and River. Eighteen are located inland in the Chicago area, and 1 each at Indiana Harbor, Ind., and Hammon, Ind. Of the 22 elevators on the water front, 19 are used for the transfer of grain between water and rail, and 3 in connection with the manufacture of grain products. Of the 20 elevators located inland,

EXTRA TRIAL STUDY-LIST—TO BE KEPT BY THE STUDENT

Name.....
[Surname first; then given names]

{ Urbana-Champaign
{ Address.....

Telephone.....

Date.....

College or School.....

Course (or Major).....

Class.....

Subject (i. e., Department)	Course No.	Credit Hours	Sec.	Grade	M	T	W	T	F	S	Memoranda

. B.—The Adviser's signature is not necessary on this blank, but must appear on Coupon 2 of the study-list. It should be placed at the left on the line following the last line used by the student.

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6 are used in connection with the manufacture of grain products, and 14 for reconsignment purposes. All elevators have adequate rail connections. A detailed description of these elevators is given in the following tables:

GRAIN ELEVATORS

TABLE No. 134.—*Port of Chicago, Ill.*

Name or number	South Chicago Elevator C and Annex
Owner	Chicago, Rock Island R. R. Co. (leased by J. C. Shaffer Grain Co.).
Operator	South Chicago Elevator Co.
Exact location	Ninety-third and Harbor Avenue.
Type of construction	Frame with sheet iron-covering.
Use	Public.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	2,800,000.
Normal operating capacity	2,500,000.
Number of bins	251.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	8,400.
Elevator to ship	40,000.
Ship to elevator	6,000.
Elevator to car	8,400.
Equipment for loading and unloading	Clark shovel machines; gooseneck loading spout hopper scale, 1,200 bushels capacit y.
Name of railroad connecting	Rock Island.
Tracks at elevator:	
Number	12.
Capacity, cars	120.
Supporting yards (railroad)	Rock Island; New York Central; B. & O.; Pittsburgh, Fort Wayne, & Chicago.
Number	4.
Distance from elevator	½ mile.
Capacity, cars	Rock Island 1,000.

Name or number	South Chicago Elevator D
Owner	Chicago Rock Island R. R. Co. (leased by J. C. Shaffer Gr. Co.).
Operator	South Chicago Elevator Co.
Exact location	Ninety-third and Harbor Avenue.
Type of construction	Frame, with sheet-iron covering.
Use	Private.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	1,100,000.
Normal operating capacity	900,000.
Number of bins	168.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	8,400.
Elevator to ship	25,000.
Ship to elevator	8,400.
Equipment for loading and unloading	Clark shovel machines; Sandmeyer loading spouts; Hess drier, 2,500 bushels per hour.
Other equipment	4 Monitor cleaners, 3 Monitor oat clippers, 4 Richardson separators.
Name of railroad connecting	Rock Island.
Tracks at elevator:	
Number	12.
Capacity, cars	120.
Supporting yards (railroad)	Rock Island; New York Central; Baltimore & Ohio; Pittsburgh, Fort Wayne & Chicago.
Number	4.
Distance from elevator	½ mile.
Capacity, cars	Rock Island 1,000.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Rosenbaum Elevator B
Owner	Chicago Elevator Properties Co. (Inc.).
Operator	Do.
Exact location	102d Street and Calumet River, south bank South Chicago Canal & Dock Co. slip.
Type of construction	Wood and sheet iron.
Use	Public.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	1,750,000.
Normal operating capacity	1,300,000.
Number of bins	120.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	12,000.
Elevator to ship	25,000.
Ship to elevator	8,000.
Elevator to car	12,000.
Equipment for loading and unloading	4 sets steam shovel machines; 4 scales, receiving and shipping.
Other equipment	Marine leg.
Name of railroad connecting	Rock Island R. R.
Tracks at elevator:	
Number	12.
Capacity, cars	150.
Supporting yards (railroad):	
Number	1.
Distance from elevator	½ mile.
Capacity, cars	1,000.

Name or number	Rosenbaum Elevator A
Owner	Chicago Elevator Properties Co. (Inc.).
Operator	Do.
Exact location	One hundred and second Street and Calumet River, south bank of South Chicago Dock Co.'s slip.
Type of construction	Wood, iron clad.
Use	Public.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	705,000.
Normal operating capacity	600,000.
Number of bins	76.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	8,000.
Elevator to ship	40,000.
Ship to elevator	8,000.
Elevator to car	14,000.
Equipment for loading and unloading	2 sets steam shovel machines, 6 scales, 2 receivers, 2 shippers.
Other equipment	Marine leg.
Name of railroad connecting	Rock Island R. R.
Tracks at elevator:	
Number	12.
Capacity, cars	150.
Supporting yards (railroad)	Rock Island R. R.
Number	1.
Distance from elevator	½ mile.
Capacity, cars	1,000.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Santa Fe Elevator and Annex
Owner	Atchison, Topeka & Santa Fe Railway.
Operator	Stratton Grain Co.
Exact location	South bank, west fork of South Branch, Chicago River Twenty-eighth Street and South Winchester Avenue.
Type of construction	Annex concrete tanks, balance wood with brick wall.
Use	Private.
Depth of water in berth (feet)	22.
Storage capacity (bushels):	
Maximum	1,300,000.
Normal operating capacity	1,000,000.
Number of bins	Annex, 59; workhouse, 92.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	20,000.
Elevator to ship	50,000.
Ship to elevator	7,000.
Elevator to car	25,000.
Equipment for loading and unloading	Regular hoppers, in and out spouts, marine legs, steam shovels, car pullers.
Other equipment	Driers, bleachers, clippers, cleaners, and scourers.
Name of railroad connecting	Chicago River and Indiana, and Atchison, Topeka & Santa Fe.
Tracks at elevator:	
Number	4.
Capacity, cars	60 cars.
Supporting yards (railroad)	
Number	1.
Distance from elevator	Adjacent.
Capacity, cars	300.

Name or number	Minnesota
Owner	Chicago Elevator Properties Co. (Inc.).
Operator	Do.
Exact location	1491 Hooker Street. West bank, North Branch Canal, Chicago River, at Weed Street.
Type of construction	Brick and wood, sheet-metal cupola, wood bins.
Use	Private.
Depth of water in berth (feet)	18.
Storage capacity (bushels):	
Maximum	500,000.
Normal operating capacity	425,000.
Number of bins	151.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,500.
Elevator to ship	40,000.
Ship to elevator	9,000.
Elevator to car	7,500.
Equipment for loading and unloading	5 unloading legs, 6 loading legs, 1 marine leg, 5 pairs shovel machines.
Other equipment	5 clippers (oat), 7 cleaning machines, 3 conveyor belts, 2 bleachers.
Name of railroad connecting	Chicago, Milwaukee & St. Paul.
Tracks at elevator:	
Number	3.
Capacity, cars	30.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Irondale Elevator A
Owner	Chicago Elevator Properties Co. (Inc.).
Operator	Do.
Exact location	Rock Island Slip, Calumet River, One hundred and seventh Street and Muskegon Avenue.
Type of construction	Steel.
Use	Private.
Depth of water in berth (feet)	22.
Storage capacity (bushels):	
Maximum	1,000,000.
Normal operating capacity	700,000.
Number of bins	84.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	40,000.
Elevator to ship	40,000.
Elevator to car	40,000.
Equipment for loading and unloading	Automatic shovel machines, conveyor belts and legs.
Name of railroad connecting	Chicago, Rock Island & Pacific.
Tracks at elevator:	
Number	8.
Capacity, cars	100.
Supporting yards (railroad)	Chicago, Rock Island & Pacific.
Number	2.
Distance from elevator	½ mile.
Capacity, cars	1,000.

Name or number	Rialto
Owner	Wabash R. R. Co.
Operator	Star Grain Co.
Exact location	Calumet River and One hundred and fourth Street, north bank of South Chicago Canal & Dock Co.'s slip No. 4.
Type of construction	Steel, tile, and concrete.
Use	Private.
Depth of water in berth (feet)	25.
Storage capacity (bushels):	
Maximum	2,500,000.
Normal operating capacity	2,200,000.
Number of bins	183.
Normal loading and unloading capacity (bushels per hour).	125,000 ten hours.
Car to elevator	75 to 100 cars. (10 hours.)
Elevator to ship	40,000 per hour.
Ship to elevator	18,000 per hour.
Elevator to car	10,000 per hour.
Equipment for loading and unloading	10 pits for receiving from cars, 1 marine leg, 8 spouts for loading into boats, 5 spouts for loading into cars.
Other equipment	Cleaning and conditioning units.
Name of railroad connecting	Belt Ry.
Tracks at elevator:	
Number	6.
Capacity, cars	75.
Supporting yards (railroad)	Belt Ry.
Number	2 tracks.
Distance from elevator (feet)	400–600.
Capacity, cars	150–200.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Norris
Owner	Norris Grain Co.
Operator	Do.
Exact location	Calumet River and Ninety-eighth Street. East bank of Calumet River.
Type of construction	Frame and concrete, frame metal-clad.
Use	Private.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	2,500,000.
Normal operating capacity	2,000,000.
Number of bins	168.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	12,000.
Elevator to ship	35,000.
Elevator to car	25,000.
Equipment for loading and unloading	1 receiving leg in frame section, 1 receiving leg in concrete section, 3 shipping legs in frame section, 8 scales.
Other equipment	2-unit Hess drier, 1 cleaner, 1 blower.
Name of railroad connecting	Indiana Harbor Belt and Pittsburgh, Fort Wayne & Chicago.
Tracks at elevator:	
Number	7.
Capacity, cars	125.
Supporting yards (railroad)	One hundred and eighth Street.
Number	2 Pennsylvania and Indiana Harbor Belt.
Distance from elevator	1 mile.
Capacity, cars	500.

Name or number	Keystone
Owner	Edward R. Bacon heirs.
Operator	Edward R. Bacon Grain Co.
Exact location	One hundred and sixth Street and Calumet River, east bank, Chicago, Ill.
Type of construction	Steel and wood.
Use	Public and private.
Depth of water in berth (feet)	22.
Storage capacity (bushels):	
Maximum	1,200,000.
Normal operating capacity	1,000,000.
Number of bins	106.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	12,000.
Elevator to ship	35,000.
Elevator to car	25,000.
Equipment for loading and unloading	Unloading, steam shovels; loading, spouts to cars and boats.
Other equipment	Oat clippers, cleaning machinery, and grain driers.
Name of railroad connecting	Indiana Harbor Belt Ry. and Pennsylvania Ry.
Tracks at elevator:	
Number	2.
Capacity, cars	18.
Supporting yards (railroad):	
Number	1.
Distance from elevator	Adjoining.
Capacity, cars	140.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Calumet Elevator A
Owner	Chesapeake & Ohio Ry.
Operator	Rosenbaum Bros.
Exact location	Calumet River, north bank of South Chicago Dock Co.'s slip at One hundred and second Street.
Type of construction	Frame, sheet-iron covering.
Use	Private.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	900,000.
Normal operating capacity	850,000.
Number of bins	160.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to ship	45,000.
Elevator to car	10,000.
Elevator to barge or lighter	45,000.
Equipment for loading and unloading	Clark power shovels, 10 hopper scales.
Other equipment	1 Hess drier, 1,000 bushels per hour; 4 cleaners, 3 clippers.
Name of railroad connecting	Belt Railroad of Chicago.
Tracks at elevator	Service track only.
Supporting yards (railroad)	Belt R. R. of Chicago.
Distance from elevator	Near by.
Capacity, cars	300.

Name or number	Calumet Elevator "B"
Owner	Chesapeake & Ohio Ry.
Operator	Rosenbaum Bros.
Exact location	Calumet River, north bank of South Chicago Dock Co.'s slip at One hundred and second Street.
Type of construction	Frame, sheet-iron covering.
Use	Private.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	900,000.
Normal operating capacity	850,000.
Number of bins	104.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	5,000.
Elevator to ship	25,000.
Elevator to car	50,000.
Elevator to barge or lighter	25,000.
Equipment for loading and unloading	Clark power shovels, 4 hopper scales.
Name of railroad connecting	Belt R. R. of Chicago.
Tracks at elevator:	
Number	Service track only.
Supporting yards (railroad)	Belt R. R. of Chicago yards.
Distance from elevator	Near-by.
Capacity, cars	300.

Name or number	Calumet Elevator "C"
Owner	Chesapeake & Ohio Ry.
Operator	Rosenbaum Bros.
Exact location	Calumet River, north bank of South Chicago Dock Co.'s slip at One hundred and second Street.
Type of construction	Frame, sheet-iron covering.
Use	Public.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	1,250,000.
Normal operating capacity	1,150,000.
Number of bins	156.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to ship	25,000.
Ship to elevator	4,000.
Elevator to car	10,000.
Elevator to barge or lighter	25,000.
Equipment for loading and unloading	Clark power shovels, 4 hopper scales.
Name of railroad connecting	Belt R. R. of Chicago.
Tracks at elevator	Service track only.
Supporting yards (railroad)	Belt R. R. of Chicago yards.
Distance from elevator	Near-by.
Capacity, cars	300.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Quincy
Owner	Chicago, Burlington & Quincy R. R.
Operator	Quincy Elevator Co.
Exact location	Twenty-second and Sangamon Streets, north bank of South Branch, Chicago River.
Type of construction	Wood, partly sheathed by brick, slate, and iron.
Use	Public.
Depth of water in berth (feet)	17 feet.
Storage capacity (bushels):	
Maximum	1,300,000.
Normal operating capacity	1,250,000.
Number of bins	299.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,500.
Elevator to ship	35,000.
Elevator to car	7,500.
Equipment for loading and unloading	Steam shovels, regular hoppers, and loading spouts.
Name of railroad connecting	Chicago, Burlington & Quincy.
Tracks at elevator:	
Number	3.
Capacity, cars	15.
Supporting yards (railroad)	Chicago, Burlington & Quincy.
Number	2.
Distance from elevator	¼ mile.
Capacity, cars	250.

Name or number	Central Elevator A
Owner	Illinois Central R. R. Co.
Operator	Norris Grain Co.
Exact location	South side Chicago River, east of Michigan Avenue Bridge, 256 East South Water Street.
Type of construction	Wood and brick veneer.
Use	Private.
Depth of water in berth (feet)	21.
Storage capacity (bushels):	
Maximum	700,000.
Number of bins	165.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	6,000.
Elevator to ship	18,000.
Elevator to car	6,000.
Equipment for loading and unloading	4 unloading legs, steam; 6 shipping legs; 6 shipping scales; 7 car-loading spouts; 4 receiving scales.
Name of railroad connecting	Illinois Central.
Tracks at elevator:	
Number	4.
Capacity, cars	17.
Supporting yards (railroad):	
Number	1.
Distance from elevator	1,000 feet.
Capacity, cars	12.

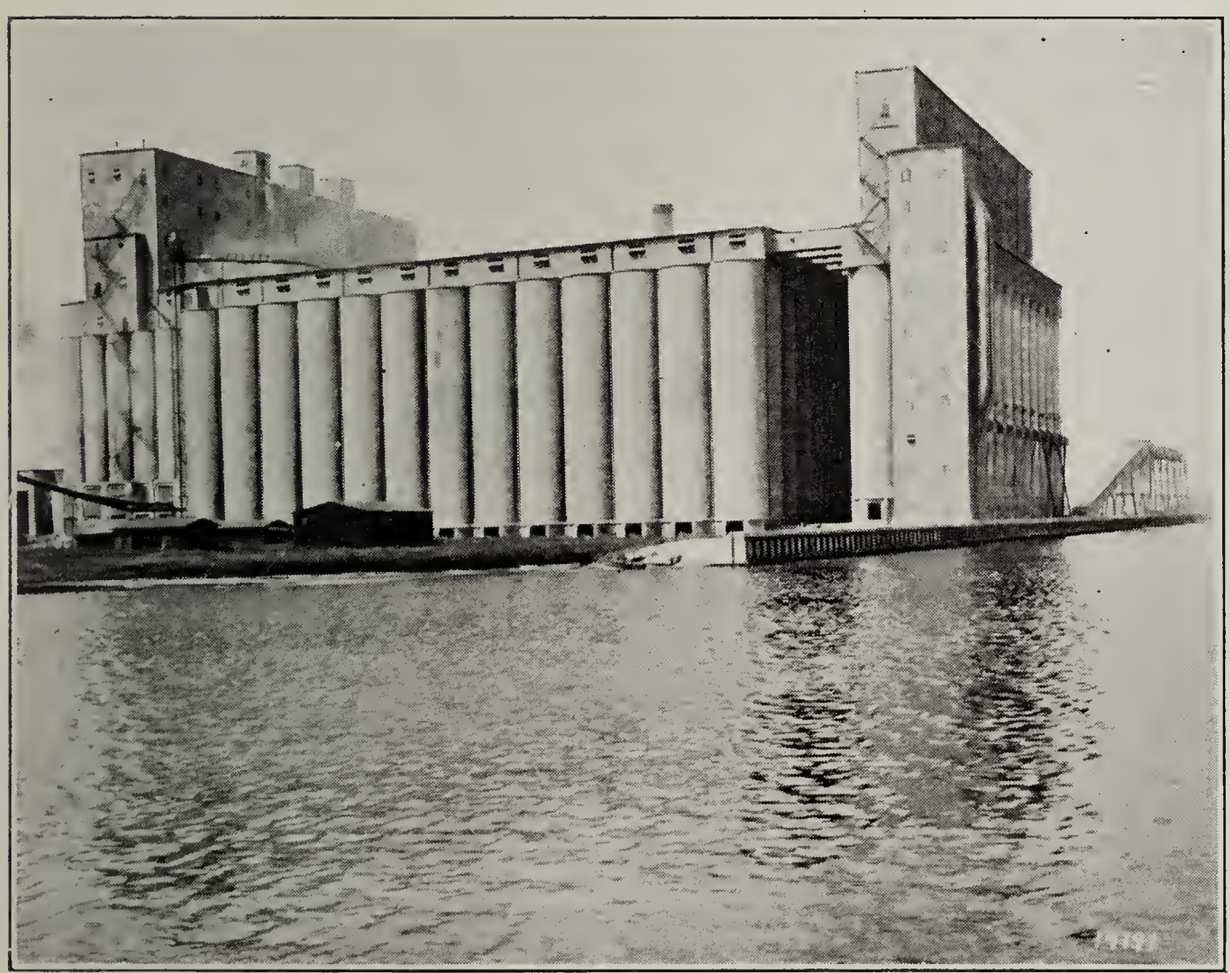
Name or number	St. Paul Elevator A
Owner	Chicago Elevator Properties Co. (Inc.).
Operator	Do.
Exact location	1325 Hooker Street, west bank North Branch Canal, Chicago River.
Type of construction	Brick and wood, sheet-metal cupola.
Use	Public.
Depth of water in berth (feet)	18.
Storage capacity (bushels):	
Maximum	2,000,000.
Normal operating capacity	1,750,000.
Number of bins	398.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	15,000.
Elevator to ship	80,000.
Ship to elevator	6,000.
Elevator to car	10,000.
Equipment for loading and unloading	20 unloading legs, 16 loading legs, 1 marine leg, 20 pairs shovel machines.
Name of railroad connecting	Chicago, Milwaukee & St. Paul.
Tracks at elevator:	
Number	3.
Capacity, cars	90.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Chicago & Northwestern Elevator
Owner	Chicago & Northwestern Ry.
Operator	Chicago Elevator Properties Co. (Inc.).
Exact location	West bank of Calumet River near One Hundred and Twenty-second Street and Torrence Avenue, South Chicago, Ill.
Type of construction	Reinforced steel and concrete.
Use	One-half public, one-half private.
Depth of water in berth (feet)	22–23.
Storage capacity (bushels):	
Maximum	9,000,000.
Normal operating capacity	8,000,000.
Number of bins	209 large, 167 small.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	20 cars per hour; average, 30,000 bushels.
Elevator to ship	80,000 bushels.
Ship to elevator	18,000 bushels.
Elevator to car	150 cars per 8 hours; average, 225,000 bushels.
Equipment for loading and unloading	6 loading legs, 6 loading spouts, 24 unloading pits with power grain shovels.
Other equipment	One marine unloading peg; 18,000 bushels per hour.
Name of railroad connecting	Chicago & Northwestern.
Tracks at elevator:	
Number	4 unloading, 2 loading.
Capacity, cars	100 cars; 40 cars.
Supporting yards (railroad)	C. & N W., Pennsylvania, Belt Ry., C. R. I. & P.
Number	4.
Distance from elevator	C. & N. W. yard ½ mile from elevator, supported by the other named roads.
Capacity, cars	C. & N. W. Ry. yards 1,200 cars; the other railroad yards are about 2 miles or more from elevator and feed the C. & N. W. Ry. yards.

Name or number	National
Owner	National Elevator Co.
Operator	Rosenbaum Bros.
Exact location	East bank, South Branch of Chicago River; Wallace Street and Archer Avenue.
Type of construction	Brick and tile.
Use	Public.
Depth of water in berth (feet)	12–15.
Storage capacity (bushels):	
Maximum	750,000.
Normal operating capacity	700,000.
Number of bins	142 bins, 20 pockets.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	4,500.
Elevator to ship	18,000.
Elevator to car	2,500.
Elevator to barge or lighter	10,000.
Equipment for loading and unloading	6 receiving legs, steam power shovels, 6 receiving scales, 8 shipping legs, 8 vessel-loading scales, 6 car-loading spouts.
Name of railroad connecting	Chicago, Rock Island & Pacific.
Tracks at elevator:	
Number	3.
Capacity, cars	50.

CHICAGO & NORTH WESTERN RAILWAY GRAIN ELEVATOR, MILWAUKEE WIS. (CAPACITY, 1,250,000 BUSHELS)



CHICAGO & NORTH WESTERN RAILWAY GRAIN ELEVATOR, CALUMET RIVER, SOUTH CHICAGO, ILL. (CAPACITY, 9,000,000 BUSHELS)

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Rock Island Elevator A
Owner	Chicago, Rock Island & Pacific Ry.
Operator	Chicago Elevator Properties Co. (Inc.).
Exact location	East bank, South Branch, Chicago River, at Thirteenth Street.
Type of construction	Brick and wood, iron sheathing.
Use	Public.
Depth of water in berth (feet)	18 feet.
Storage capacity (bushels):	
Maximum	1,200,000.
Normal operating capacity	1,000,000.
Number of bins	257.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to ship	25,000.
Elevator to car	10,000.
Equipment for loading and unloading	8 dock spouts, 6 car-loading spouts; steam power shovels, receiving scales.
Name of railroad connecting	Rock Island.
Tracks at elevator:	
Number	2.
Capacity, cars	6.
Supporting yards (railroad)	Rock Island.
Number	1.
Distance from elevator	200 feet.
Capacity, cars	25.

Name or number	Belt Elevator
Owner	Rosenbaum Bros.
Operator	Do.
Exact location	Eighty-seventh Street and Stewart Avenue.
Type of construction	Wood, brick, iron sheathing.
Use	Public.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	1,300,000.
Normal operating capacity	1,300,000.
Number of bins	80 bins, 9 tanks.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,000.
Elevator to car	8,000.
Equipment for loading and unloading	4 receiving legs, 2 shipping legs, 1 scale in drier.
Other equipment	1 Ellis dryer, 1,000 bushels per hour; 2 cleaners, 800 bushels per hour; 1 separator, 800 bushels per hour.
Name of railroad connecting	Belt R. R. of Chicago.
Tracks at elevator:	
Number	6.
Capacity, cars	150.
Supporting yards (railroad)	Belt R. R. yards.
Distance from elevator	1 block.
Capacity, cars	3,000.

Name or number	Elevator J
Owner	Chicago Elevator Properties Co. (Inc.).
Operator	Do.
Exact location	123d Street and C. & E. I. tracks.
Type of construction	Steel and concrete.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	750,000.
Normal operating capacity	15 cars per day (220,000 bushels).
Number of bins	50.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2 cars; 3,000.
Elevator to car	Do.
Equipment for loading and unloading	2 track scales and nappers (one each track), regulating legs; 2 shipping spouts and weighing equipment.
Other equipment	2 cleaners and 2 driers.
Name of railroad connecting	Michigan Central.
Tracks at elevator:	
Number	2.
Capacity, cars	21.
Supporting yards (railroad)	Michigan Central.
Number	1.
Distance from elevator	1,500 feet.
Capacity, cars	450.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Grand Trunk
Owner	Grand Trunk Western Ry.
Operator	Edward R. Bacon Grain Co.
Exact location	Fifty-first Street and Holman Avenue (Elsdon), Chicago, Ill.
Type of construction	Tanks, concrete; working house, steel and wood.
Use	Private.
Depth of water in berth	Not on water front, rail house only.
Storage capacity (bushels):	
Maximum	450,000.
Normal operating capacity	400,000.
Number of bins	32 bins, 12 tanks.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,000.
Elevator to car	7,000.
Equipment for loading and unloading	Unloading, steam shovels; loading, spouts to cars.
Other equipment	Oat clipping and bleaching machinery.
Name of railroad connecting	Grand Trunk Western Ry.
Tracks at elevator:	
Number	2.
Capacity, cars	20.
Supporting yards (railroad):	
Number	4.
Distance from elevator	Adjoining.
Capacity, cars	60.

Name or number	Kensington
Owner	Michigan Central R. R. Co.
Operator	Kensington Elevator Co.
Exact location	One hundred and twenty-fourth Street and Cottage Grove Avenue, South Chicago, Ill.
Type of construction	Concrete and steel.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	200,000.
Normal operating capacity	100,000.
Number of bins	53.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to car	15,000.
Equipment for loading and unloading	Equipment for loading and unloading; 3 loading spouts, 6 unloading legs.
Other equipment	2 cleaners, one bleacher; 3 clippers, 1 drier.
Name of railroad connecting	Michigan Central.
Tracks at elevator:	
Number	3.
Capacity, cars	40.
Supporting yards (railroad)	Michigan Central.
Number	11 tracks.
Distance from elevator	¼ mile.
Capacity, cars	80 cars.

Name or number	New York Central
Owner	New York Central R. R. Co.
Operator	Bartlett Frazier Co.
Exact location	One hundred and twenty-fifth Street and N. Y. C. R. R. tracks, Indiana Harbor, Ind.
Type of construction	Tile, steel, and concrete.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	1,000,000.
Number of bins	102 bins.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to car	20,000.
Equipment for loading and unloading	Loading spouts and steam shovel.
Other equipment	Dryer, cleaners, and oat clippers.
Name of railroad connecting	New York Central.
Tracks at elevator:	
Number	5.
Capacity, cars	90.
Supporting yards (railroad)	Indiana Harbor Belt.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Pennsylvania
Owner	J. J. Badenoch Co.
Operator	Do.
Exact location	Thirteenth and Rockwells Streets.
Type of construction	Brick and woodwork house, steel tanks.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	500,000.
Normal operating capacity	250,000.
Number of bins	50.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,000.
Elevator to car	7,000.
Equipment for loading and unloading	1 power shovel, 1 steel ship spout.
Other equipment	1 cleaner, 1 clipper.
Name of railroad connecting	Pennsylvania, Chicago & North Western.
Tracks at elevator:	
Number	3.
Capacity, cars	12.
Supporting yards (railroad)	None.

Name or number	Fleischman Malting Co.
Owner	The Fleischman Malting Co.
Operator	Do.
Exact location	2153 West Fifty-first Place.
Type of construction	Fireproof, brick, and concrete.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	325,000.
Number of bins	18 tanks, 7 pockets, 10 bins.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,100.
Elevator to car	1,100.
Equipment for loading and unloading	2 unloading pits, 2 power shovel machines, track scales, 1 loading spout.
Other equipment	Brick kiln, 1 S Howes malt cleaner, 1 Richardson barley separator, 2 Eureka 10-cylinder graders, 2 Carter oats separators, 1 S Howes double-needle machine.
Name of railroad connecting	Pennsylvania.
Tracks at elevator: Capacity, cars	10.

Name or number	Cragin
Owner	Cragin Products Co.
Operator	Cragin Elevator Co.
Exact location	1923 North Laramie Avenue.
Type of construction	Frame, sheet-iron covering.
Use	Public.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	600,000.
Normal operating capacity	450,000.
Number of bins	72.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	6,000.
Elevator to car	6,000.
Equipment for loading and unloading	Hopper and track scales.
Other equipment	Drying, capacity 1,000 bushels per hour.
Name of railroad connecting	Chicago, Milwaukee & St. Paul.
Tracks at elevator:	
Number	3.
Capacity, cars	30.
Supporting yards (railroad)	Chicago, Milwaukee & St. Paul.
Number	1.
Distance from elevator	Adjacent.
Capacity, cars	7,000.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Hales
Owner	Hales & Hunter.
Operator	Do.
Exact location	Riverdale, Ill. (Calumet district).
Type of construction	Concrete and brick.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	1,000,000.
Normal operating capacity	750,000.
Number of bins	40.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	4,500.
Elevator to car	5,000.
Equipment for loading and unloading	4 unloading pits, 2 loading spouts.
Name of railroad connecting	Indiana Harbor Belt.
Tracks at elevator:	
Number	6.
Capacity, cars	200.

Name or number	Concrete
Owner	Hales & Hunter.
Operator	Do.
Exact location	Forty-sixth Avenue and Kenton Street.
Type of construction	Concrete and steel.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	1,500,000.
Normal operating capacity	1,250,000.
Number of bins	54.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000.
Elevator to car	2,000.
Equipment for loading and unloading	2 unloading pits, 1 unloading spout.
Name of railroad connecting	Chicago & North Western. Chicago, Milwaukee & St. Paul.
Tracks at elevator:	
Number	2.
Capacity, cars	15.

Name or number	Standard
Owner	Norris Grain Co.
Operator	Do.
Exact location	Trankle Court and Indiana Harbor Belt R. R. tracks, Hammond, Ind.
Type of construction	Steel, brick, and concrete.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	340,000.
Number of bins	36.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,000.
Elevator to car	3,000.
Equipment for loading and unloading	Clark Power Shovel machines; single telescope spout by gravity.
Other equipment	Dryer and bleacher.
Name of railroad connecting	Indiana Harbor Belt, and Pittsburgh, Fort Wayne & Chicago.
Tracks at elevator:	
Number	3.
Capacity, cars	60.
Supporting yards (railroad)	Pittsburgh, Fort Wayne & Chicago.
Number	1.
Distance from elevator	100 feet.
Capacity, cars	150.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Star and Crescent
Owner	Washburn Crosby Co.
Operator	Do.
Exact location	Slip No. 4, One hundred and fourth Street and Calumet River.
Type of construction	Wood and concrete.
Use	Private.
Depth of water in berth (feet)	20.
Storage capacity (bushels):	
Maximum	300,000.
Normal operating capacity	200,000.
Number of bins	50.
Normal loading and unloading capacity (bushels per hour): Car to elevator	3,000 or 2 cars.
Equipment for loading and unloading	1 unloading leg, 4,500 bushels hourly; 1 small loading leg; 2 car pits; 2 twin hopper scales.
Other equipment	1 separator; 2 scales; scowers, scalpers, and completed equipment for mixing.
Name of railroad connecting	Belt R. R. of Chicago.
Tracks at elevator:	
Number	2.
Capacity, cars	40.
Supporting yards (railroad)	Belt Ry.
Number	1.

Name or number	Grand Crossing
Owner	N. Y. C. and St. L. R. R. Co.
Operator	Frank G. Ely.
Exact location	Seventy-seventh Street and I. C. R. R. tracks.
Type of construction	Brick and wood.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	100,000.
Normal operating capacity	50,000.
Number of bins	32.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,500.
Elevator to car	1,500.
Equipment for loading and unloading	Steam shovels for unloading, hopper scale and gravity spout for loading.
Other equipment	Cleaners and clippers.
Name of railroad connecting	Illinois Central.
Tracks at elevator:	
Number	2.
Capacity, cars	8 cars.
Supporting yards (railroad)	Illinois Central.
Number	2.
Distance from elevator	½ mile.
Capacity, cars	Large; Fordham & Markham.

Name or number	Northwestern Yeast
Owner	Northwestern Yeast Co.
Operator	Do.
Exact location	Marshfield Avenue and Bloomingdale Road, Chicago, Ill.
Type of construction	Tile and concrete.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	350,000.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,000.
Equipment for loading and unloading	Power shovel.
Other equipment	Fairbanks hopper scale, Hess dryer.
Name of railroad connecting	Chicago, Milwaukee & St. Paul and Pennsylvania.
Tracks at elevator:	
Number	1.
Capacity, cars	6.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Wright & Hills
Owner	Spencer Kellogg & Sons (Inc.).
Operator	Do.
Exact location	2215 Lumber Street, South Branch, Chicago River.
Type of construction	Brick.
Use	Private.
Depth of water in berth (feet)	16.
Storage capacity (bushels):	
Maximum	250,000.
Normal operating capacity	150,000.
Number of bins	39.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,600.
Ship to elevator	6,000.
Equipment for loading and unloading	Marine leg.
Name of railroad connecting	Chicago, Burlington & Quincy.
Tracks at elevator:	
Number	3.
Capacity, cars	10.
Supporting yards (railroad)	Chicago, Burlington & Quincy.
Number	2 yards.
Distance from elevator	¼ mile.
Capacity, cars	1,000.

Name or number	Schwill Elevator A
Owner	Albert Schwill & Co.
Operator	Do.
Exact location	One hundred and third Street and Pittsburgh, Fort Wayne & Chicago R. R. tracks.
Type of construction	Wood, sheet-iron covering.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Number of bins	60.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,300.
Elevator to car	1,300.
Equipment for loading and unloading	2 track scales, 5 hopper scales.
Name of railroad connecting	New York Central and Pennsylvania.
Tracks at elevator:	
Number	2.
Capacity, cars	8.
Supporting yards (railroad)	New York Central yards at South Chicago.
Distance from elevator	2 miles.

Name or number	Schwill Elevator B
Owner	Albert Schwill & Co.
Operator	Do.
Exact location	One hundred and third Street and Pittsburgh, Fort Wayne & Chicago R. R. tracks.
Type of construction	Tile.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	1,500,000.
Number of bins	48.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,800.
Elevator to car	1,800.
Equipment for loading and unloading	2 track scales, 2 hopper scales.
Name of railroad connecting	New York Central and Pennsylvania.
Tracks at elevator:	
Number	2.
Capacity, cars	13.
Supporting yards (railroad)	New York Central yards at South Chicago.
Distance from elevator	2 miles.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Wabash
Owner	Wabash R. R.
Operator	Central Elevator Co.
Exact location	East bank of South Fork of South Branch of Chicago River at Thirty-third Street.
Type of construction	Brick.
Use	Public and private.
Depth of water in berth (feet)	19.
Storage capacity (bushels):	
Maximum	1,500,000.
Normal operating capacity	1,300,000.
Number of bins	254.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	9.500.
Elevator to ship	40,000.
Elevator to car	13,000.
Equipment for loading and unloading	10 receiving elevators, 10 shipping elevators.
Name of railroad connecting	Wabash R. R.
Tracks at elevator:	
Number	10.
Capacity, cars	100.

Name or number	Columbia Malting Co.
Owner	Columbia Malting Co.
Operator	Do.
Exact location	One hundred and fifth Street and Indianapolis Avenue, South Chicago, Ill.
Type of construction	Steel, cement, and brick.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	700,000.
Number of bins	84 bins.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	4,000.
Elevator to car	4,000.
Equipment for loading and unloading	1 leg each.
Name of railroad connecting	Pennsylvania and New York Central.
Tracks at elevator:	
Number	2.
Capacity, cars	11 unloading, 5 loading.
Supporting yards (railroad):	
Number	2.
Distance from elevator	¼ mile.
Capacity, cars	Approximately, 3,000.

Name or number	Byrnes Elevator
Owner	W. J. Byrnes.
Operator	Do.
Exact location	Thirty-second and La Salle Streets, Chicago, Ill.
Type of construction	Brick with wooden cribbing.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	38,000.
Normal operating capacity	30,000.
Number of bins	18.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000.
Elevator to car	3,000.
Equipment for loading and unloading	Belt, buckets, and gravity spouts.
Other equipment	Sundry grain cleaning and separating machines, grinders, and mixers.
Name of railroad connecting	Chicago, Rock Island & Pacific.
Tracks at elevator:	
Number	1.
Capacity, cars	5.
Supporting yards (railroad)	Chicago, Rock Island & Pacific.
Number	1.
Distance from elevator	1 mile.
Capacity, cars	100.

TABLE No. 134.—*Port of Chicago, Ill.*—Continued

Name or number	Badenoch Elevator
Owner	J. J. Badenoch Co.
Operator	Do.
Exact location	2001 West Seventeenth Street, Chicago.
Type of construction	Concrete house and tanks.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	750,000.
Normal operating capacity	500,000.
Number of bins	100.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	21,000.
Elevator to car	21,000.
Equipment for loading and unloading	2 motor driven shovels, 2 shipping spouts.
Name of railroad connecting	Chicago, Burlington & Quincy.
Tracks at elevator:	
Number	3.
Capacity, cars	26.
Supporting yards (railroad)	Chicago, Burlington & Quincy.
Number	1.
Distance from elevator	1 mile.
Capacity, cars	50.

Name or number	Prairie State Elevator
Owner	Estate of T. W. Keelin, deceased.
Operator	Prairie State Milling Co.
Exact location	4553 Lexington Street, Chicago.
Type of construction	Reinforced concrete.
Use	Private.
Depth of water in berth	Not located on water.
Storage capacity (bushels):	
Maximum	100,000, approximately.
Normal operating capacity	75,000, approximately.
Number of bins	50.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000.
Elevator to car	2,000.
Equipment for loading and unloading	Bucket elevator and power shovels.
Other equipment	General feed mill equipment.
Name of railroad connecting	Belt Ry. of Chicago.
Tracks at elevator:	
Number	1.
Capacity, cars	3 cars.

Name or number	B. A. Eckhart Elevator
Owner	B. A. Eckhart Milling Co.
Operator	Do.
Exact location	1300 Carroll Avenue, Chicago, Ill.
Type of construction	Part concrete, part wood cribbed-iron clad.
Use	Private.
Depth of water in berth	Not on water front.
Storage capacity (bushels):	
Maximum	750,000.
Normal operating capacity	700,000.
Number of bins	60.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,000.
Elevator to car	3,000.
Equipment for loading and unloading	Belt conveyors.
Name of railroad connecting	Pennsylvania.
Tracks at elevator:	
Number	2.
Capacity, cars	8.
Supporting yards (railroad)	Pennsylvania.
Number	1.
Distance from elevator	½ mile.

LUDINGTON, MICH.

This port is situated on the east shore of Lake Michigan at the outlet of the Pere Marquette River, about 155 miles north of Chicago. A grain elevator of 150,000 bushels capacity, located on the water-front at the foot of Donaher Street, is owned and operated by the Pere Marquette Railway. This elevator is used for transferring grain from vessels to cars and has no equipment for cleaning, drying, or mixing. Vessels are unloaded at a normal rate of 6,000 bushels per hour and cars are loaded at the rate of 10,000 bushels per hour. The rail connections consist of one track at the elevator, with a capacity of nine cars, served by the Pere Marquette Railway. The storage yard of this railroad is located at the car-ferry terminal and has capacity for 1,500 cars.

GRAIN ELEVATORS

TABLE NO. 135.—*Port of Ludington, Mich.*

Name or number	Per Marquette Grain Elevator
Owner	Pere Marquette Ry.
Operator	Do.
Exact location	Foot of Donaher Street.
Type of construction	Timber and corrugated iron.
Use	Public.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	150,000.
Normal operating capacity	150,000.
Number of bins	11.
Normal loading and unloading capacity (bushels per hour):	
Ship to elevator	6,000.
Elevator to car	10,000.
Equipment for loading and unloading	Marine leg, 2 Fairbanks scales.
Name of railroad connecting	Pere Marquette.
Tracks at elevator:	
Number	1.
Capacity, cars	9.
Supporting yards:	
Distance from elevator	At car-ferry terminal.
Capacity, cars	1,500.

LOWER LAKE PORTS

DEPOT HARBOR

This port is situated on the north shore of Parry Island about 5 miles from Parry Sound Harbor and 378 miles by rail from Montreal. The entrance to the harbor is one-fourth mile wide and has a least depth of 6 fathoms, while the harbor proper has a depth of 5 fathoms. The elevator wharf is situated on the north side of the harbor and is 1,200 feet long and 81 feet wide. The depth of water alongside the wharf is 25 feet.

The elevator at this port is operated by the Stratton Grain Co., of Chicago, and has a capacity of 1,600,000 bushels. The workhouse and the first storage unit were built in 1898 and the second storage unit in 1906. Construction is entirely of wood with metal covering.

There are two fixed marine legs having a receiving capacity of 15,000 bushels per hour each. For loading cars there are two spouts with a rated capacity each of 18,000 bushels or a total of 36,000 bushels per hour. Other equipment consists of a sacking plant with a capacity of 1,000 bushels per hour and a monitor cleaner with a capacity of 3,000 bushels per hour. This elevator receives grain by water only and ships by rail. There is connection with the tracks of the Canadian National Railway.

PORT McNICOLL

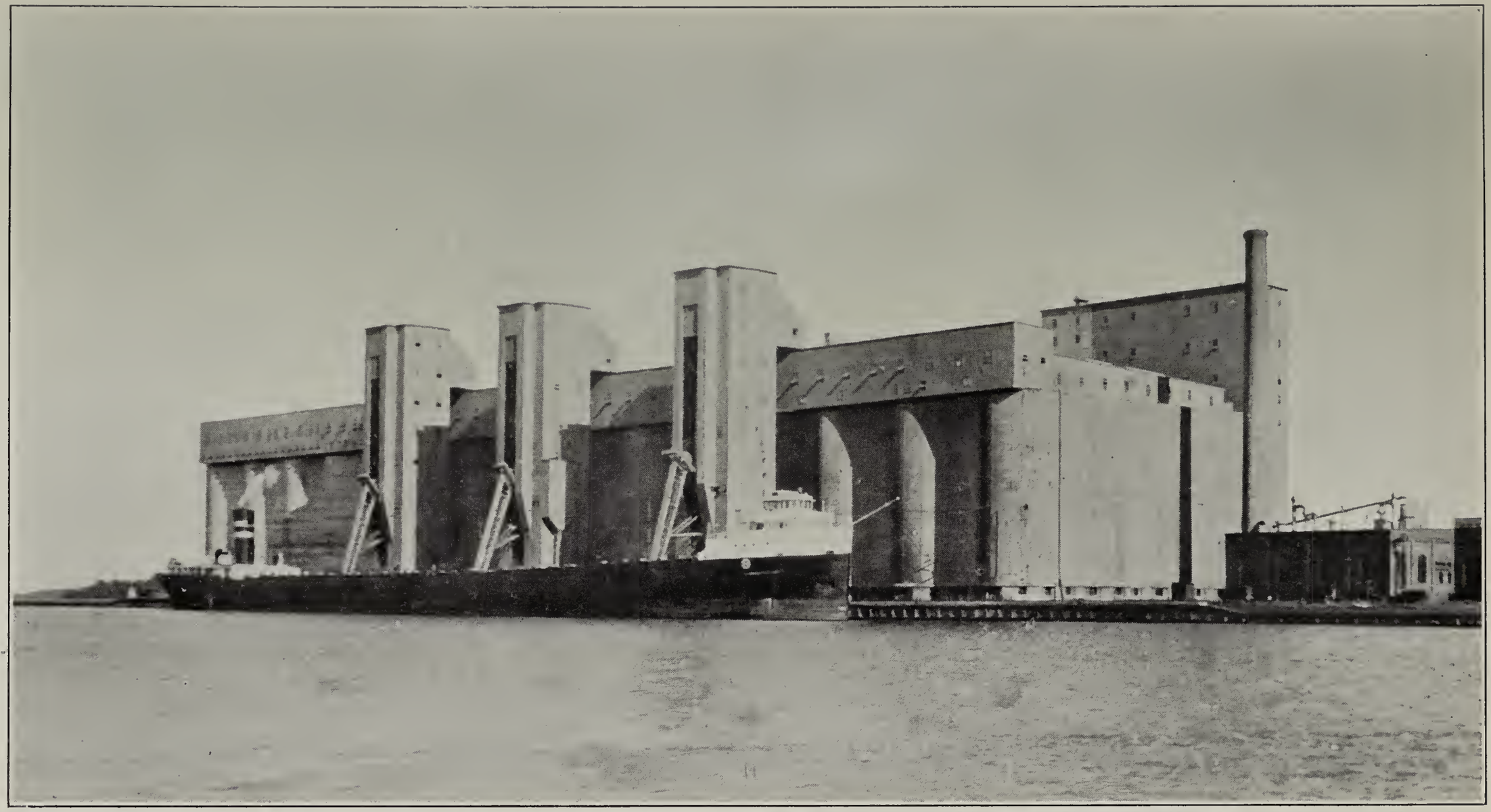
Port McNicoll is an important transfer point for grain and general cargo moving via the Canadian Pacific rail and water lines. It is 365 miles by rail from Montreal, and is the eastern terminus of this company's steamship line plying to Port Arthur and Fort William on Lake Superior. This line carries both freight and passengers. The company has an improved harbor consisting of a dredged slip 3,100 feet long on the west side of Hog Bay. The slip has a width of 600 feet and a depth of 24 feet. The entire easterly side has been improved by a concrete wharf, on which are the passenger and package freight terminals. On the west side, the wharf is 850 feet long and serves a grain elevator of 6,500,000 bushels capacity, which is one of the most important transfer elevators of Georgian Bay.

The elevator is of steel and concrete construction and is adapted for transfer from lake carriers to cars or loading out to vessels. The equipment for unloading consists of three marine legs having an average working capacity from dip to clean up of 12,000 bushels per hour each. These three legs, two of which are movable and the other fixed, are served by three receiving scales having a capacity of 1,000 bushels per hour each. The shipping facilities to cars consist of three shipping legs, two of which have capacities of 12,000 bushels per hour each and the other a capacity of 18,000 bushels per hour. There are six car-loading spouts which are capable of loading twenty cars per hour. For loading to vessels a loading spout attached to a movable marine tower has a capacity of 12,000 bushels per hour. Any of the shipping scales can be used for loading grain to vessels. Additional equipment consists of a cleaner with a capacity of 1,500 bushels per hour. The yards immediately adjacent to the elevator have a storage capacity of 600 cars. The harbor provides accommodation for winter storage of grain in vessels.

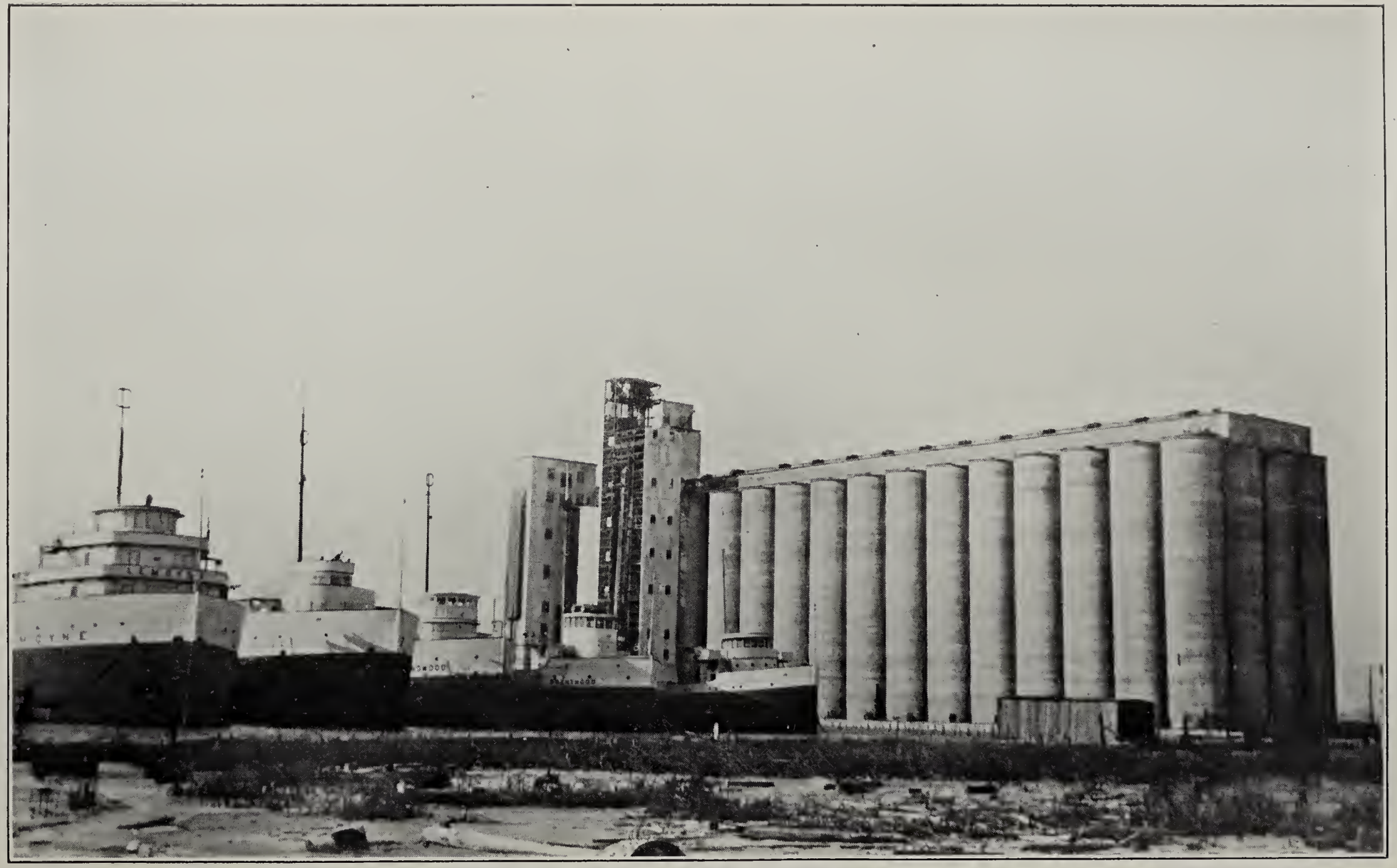
TIFFIN

Tiffin is located on Midland Bay at a distance of approximately 2 miles from Midland. It is on the Canadian National Railways.

Tiffin No. 1 elevator is owned and operated by the Aberdeen Elevator Co. It is constructed of steel and concrete and has a capacity of 1,000,000 bushels. There is one fixed marine leg for transferring



CANADIAN PACIFIC RAILWAY ELEVATOR, PORT McNICOLL, ONTARIO (CAPACITY, 6,100,000 BUSHELS)



SARNIA ELEVATOR, SARNIA, ONTARIO (CAPACITY, 3,000,000 BUSHELS)

grain from vessels into the elevator. This has an average normal capacity of 14,000 bushels per hour. It is used for transferring grain from water carriers to rail carriers. The depth of water alongside is 20 to 25 feet. It has two spouts with a loading capacity of 12,500 bushels per hour each to cars. Two cars can be loaded at one time. There are two receiving scales and four shipping scales. This elevator is operated by electricity.

Tiffin Elevator No. 2, owned and operated by the Canadian National Railways, is constructed of steel and concrete and has a capacity of 4,500,000 bushels. There are three movable marine legs, each having a maximum capacity of 18,000 bushels per hour. The average working capacity for the three is 35,000 bushels. It has a shipping-out capacity to cars of 30,000 bushels per hour. The elevator has three receiving scales and four shipping scales, thus permitting the loading of four cars at one time. The supporting yards have a capacity for about 320 cars. This is a thoroughly modern elevator and is well equipped for securing dispatch in the handling of grain. It is used largely for export business moving to Montreal and Portland, Me. Grain may be loaded to vessels at a rate of 12,000 bushels per hour.

MIDLAND

This port is situated on Midland Bay, an indentation of Georgian Bay, 382.5 miles by rail from Montreal. There are two elevators for handling grain at the port with a combined storage capacity of 6,000,000 bushels. The Midland elevator, operated by Canadian Steamship Lines (Ltd.), has a wooden storehouse and concrete storage annex with a storage capacity of 4,000,000 bushels. Grain is received at a maximum rate of 28,000 bushels per hour from vessels, and cars may be loaded from elevator at a rate of 16 cars per hour. Grain is also unloaded from cars by steam-operated shovels into two car unloading pits. The elevator also has a sacking plant with a capacity of 1,000 bushels per hour. The elevator, owned and operated by the Midland-Simcoe Elevator Co. (Ltd.), is of concrete construction with a storage capacity of 2,000,000 bushels. There are two marine legs with an average capacity of 13,000 bushels per hour each. There are two receiving scales for the marine legs and one for the car receiving leg. The shipping facilities consist of three shipping legs with a capacity of 14,000 bushels each. These elevators are used principally to unload grain from the large lake carriers for transfer to cars and forwarding by rail to Montreal, by way of the Canadian National Railways.

OWEN SOUND

This port is located at the mouth of Sydenham River, head of Owen Sound at the southwest end of Georgian Bay. The elevator at this port is of concrete construction having a storage capacity of approxi-

mately 2,000,000 bushels. It is operated by the Great Lakes Elevator Co. (Ltd.). Grain is received at a maximum rate of 27,000 bushels per hour from vessels, and cars may be loaded from the elevator at a rate of 15 cars per hour. There is a car-unloading pit capable of unloading 2 cars per hour. The elevator has a sacking plant equipped with automatic scales with a rated capacity of 1,000 bushels per hour.

COLLINGWOOD

Collingwood Harbor is situated on the south shore of Georgian Bay and is 404 miles by rail from Montreal. The harbor is artificial and is formed by two piers extending from the shore into the bay. The piers inclose an area of 267 acres, only one-fourth of which, however, is suitable for use by lake carriers of even moderate draft. The dredged channel is 250 feet wide and 19 feet deep. The elevator at this place has a capacity of approximately 160,000 bushels. It was built in 1871 by the Grand Trunk Railway and is now owned by the Canadian National Railways and operated by the Edward R. Bacon Grain Co., of Chicago. It is constructed of wood on pile foundation, and has crib bins. There is one marine leg with a receiving capacity of 5,000 bushels per hour, and there are two spouts of 5,000 bushels capacity each for loading cars. Like the Tiffin No. 1 elevator and the Depot Harbor elevator it handles principally grain from the United States moving for export and for distribution throughout New England. Its storage and loading capacity are so small as to make it an unimportant factor in the situation.

GODERICH

This is an artificial harbor at the mouth of the Maitland River, on Lake Huron. The entrance is between two piers extending out at right angles to the shore for a distance of 1,050 feet. The piers are 200 feet apart and have a length of 1,600 feet. The channel between the piers affords a depth of 19 feet at standard low water, which can be carried up to the commercial wharf in the harbor. Goderich is served by the Canadian National Railways and by the Canadian Pacific Railway. It is 468 miles from Montreal by the former and 475.5 miles by the latter.

There are two elevators at this port, one of which is owned and operated by the Goderich Elevator & Transit Co. (Ltd.), and the other by the Western Canada Flour Mills Co. (Ltd.).

The elevator of the Goderich Elevator & Transit Co. was built in 1904 and has two annexes built since that date. The total capacity is 1,000,000 bushels. It is constructed of concrete and steel. There is one marine leg, with a rated capacity of 18,000 bushels per hour. For loading cars there are five spouts, three serving the tracks of the Canadian National Railways and two the tracks of the Canadian

Pacific Railway. The wharf on which the elevator is located has a length of 576 feet.

The elevator of the Western Canada Flour Mills Co. was built in 1910 and is of concrete and steel construction. The storage capacity is 600,000 bushels. It has one fixed marine leg, with a receiving capacity of 20,000 bushels per hour. There are two spouts for loading cars, with a rated capacity of 16,000 bushels each, or a total of 32,000 bushels per hour. The elevator has connections with the Canadian National Railways and the Canadian Pacific Railway. Space allotted to the former is sufficient for 10 cars and the latter for 6 cars. Track space is too small to permit this elevator to be used extensively for through business.

SARNIA

This port is situated near the head of St. Clair River, opposite Port Huron. A channel 24 feet deep was recently dredged from the river to the new Sarnia elevator. This elevator, owned by the Canadian National Railways and operated by the Sarnia Elevator Co. (Ltd.), is of concrete construction, having a storage capacity of 1,000,000 bushels. Grain is received from vessels at a maximum rate of 30,000 bushels per hour, and cars may be loaded from the elevator at a rate of 12 cars per hour. Vessels may be loaded at a rate of 9,000 bushels per hour.

PORT HURON, MICH.

Port Huron is situated at the mouth of Black River, which empties into St. Clair River. The public grain elevator formerly located at this port and owned by the Grand Trunk Elevator Co. was burned in 1924 and has not been rebuilt.

DETROIT, MICH.

This port is situated on the Detroit and Rouge Rivers. The grain elevators are principally used by their owners and operators in their private business and only one is known as a public elevator.

The Frank T. Coughey Co. elevator, owned and operated by the Frank T. Coughey Co., is a public elevator and is located at 5075 Grand River Avenue. It has a maximum storage capacity of 250,000 bushels and a normal operating capacity of 200,000 bushels. Grain is unloaded from cars at the rate of 1,500 bushels per hour and the loading rate from elevator to car is 1,500 bushels. It is equipped with a drier, various kinds of cleaning apparatus, and automatic weighing scales. Railroad connection is with the Grand Trunk Western Railway.

Rickels elevator, owned and operated by H. W. Rickels & Co., is located at 1824 Adelaide Street. It is used principally by the opera-

ting company for private purposes but is also available to the public up to 25 per cent of its capacity. The maximum storage capacity is 300,000 bushels and the normal operating capacity is 200,000 bushels. It is equipped with drying, cleaning, mixing, and sacking machinery, a railroad, and automatic weighing scales. Grain is unloaded from cars at the rate of 2,500 bushels per hour and loaded from elevator to car at the rate of 2,000 bushels. The Grand Trunk Railroad connects with this elevator.

The Commercial Milling Co. owns and operates a private elevator on the water front at the foot of Brush Street. It is not open to the public. The maximum storage capacity of this plant is 250,000 bushels. The Grand Trunk Western Railway (Canadian National Railways) connects with this plant.

David Statt Flour Mills (Inc.) has an elevator at 4895 Grand River Avenue, used exclusively for the storage of grain for milling. The maximum storage capacity is 180,000 bushels and the normal operating capacity 120,000. Grain is unloaded from cars at the rate of 1,500 bushels per hour. The Michigan Central Railroad connects with this elevator.

Lichtenberg & Son own and operate a small elevator of 35,000 bushels capacity, located at 1265 Vermont Avenue. It is used for private purposes only.

TOLEDO, OHIO

Toledo is situated at the mouth of Maumee River, which flows into Lake Erie at its westerly extremity. There are five grain elevators worthy of mention. Four of these are on the water front but only three are prepared to handle traffic by water.

The East Side Iron Elevator is public, located on the east side of Maumee River just above Navarre Avenue. The depth of water alongside is about 22 feet. The maximum capacity is 1,500,000 bushels and the normal operating capacity 950,000 bushels. Grain is unloaded from vessels by means of a marine leg at the rate of 10,000 bushels per hour, and from cars by Clarke automatic shovels at the rate of 7,000 bushels per hour. Cars are loaded from the elevator at the rate of 7,000 bushels per hour. The New York Central Railroad connects with this elevator.

The Baltimore & Ohio Railroad elevator, also known as the C. H. & D. Elevator B, and Rosenbaum Bros. Elevator, is located on the east side of Maumee River above Fassett Street bridge. It is owned by the Baltimore & Ohio Railroad, and operated by the Grain Marketing Co. It is principally used for handling the grain purchased and shipped by the operator and is not ordinarily open to the public. It is constructed of steel and concrete and is equipped with drying and cleaning apparatus. The maximum storage capacity is 500,000

bushels, and the normal operating capacity is 250,000 bushels. The Baltimore & Ohio Railroad connects with this elevator. The depth alongside for vessels is 22 feet.

The National Milling Company Elevator, located on the east side of Maumee River on Front Street, is owned and operated by the National Milling Co. and is used primarily for the storage of wheat for milling. Transit business in grain is not solicited and grain for outside interests is not ordinarily handled. The structure is frame and steel. It has no equipment for drying and cleaning. It has a maximum storage capacity of 1,250,000 bushels of grain, and a normal operating capacity of 900,000 to 1,000,000 bushels. Grain is handled from ship to elevator at the rate of 10,000 bushels per hour, and to and from cars at the rate of 7,000 bushels per hour. There are no facilities for loading grain from the elevator to ships. The Wheeling & Lake Erie Railway connects with this elevator. The berthing depth alongside for vessels is 21 feet.

The Lake Shore B Elevator is located on the west side of Maumee River above Cherry Street bridge. It is owned by the New York Central Railroad Co. and is operated as a private elevator by the Midland Elevator Co. Grain is handled only as between cars and elevator as the depth of water alongside is insufficient for the berthing of vessels. The maximum storage capacity is 375,000 bushels and the normal operating capacity is 250,000.

The Kasco Mills (Inc.) owns and operates a private elevator at No. 50 Main Street, east Toledo, in connection with its dairy and poultry feed manufacturing plant. The building is constructed of brick and the two steel tanks, of six bins each, have a maximum storage capacity of 250,000 bushels of grain. While this is a private elevator, grain is sometimes stored for the public when space is available.

CLEVELAND, OHIO

Cleveland is situated on the south shore of Lake Erie at the mouth of the Cuyahoga River, 96 miles by water easterly from Toledo.

A grain elevator open to public use is located on Stones Levee at Cincinnati Slip. This elevator, 950,000 bushels maximum storage capacity, of frame construction, is owned by the Cleveland, Cincinnati, Chicago & St. Louis Railway Co. and operated by the Cleveland Grain Co. For unloading vessels it is equipped with one marine leg, normal capacity 6,000 bushels per hour. Grain is received by rail also, and cars are unloaded at a normal rate of 6,000 bushels per hour. Grain may be shipped by water and rail, and may be loaded into vessels at a normal speed of 15,000 bushels per hour and into cars at the rate of 8,000 bushels per hour. Additional equipment consists of two cleaners, two oat clippers, one aspirator, and one dryer, with a capacity of 1,000 bushels per hour.

This elevator is served by the Cleveland, Cincinnati, Chicago & St. Louis Railway Co., the connections comprising four tracks at the elevator, capacity 32 cars, with additional car storage space near by, capacity 65 cars. No grain was received or shipped by lake during 1928.

The elevator owned and operated by Fairchild Milling Co. is located at 1635 Merwin Street on Cuyahoga River. This elevator, of wood construction, with a maximum storage capacity of 125,000 bushels, is used in the manufacture of flour and feed. It is equipped with a marine leg having a capacity of 2,500 bushels per hour loading into vessels. Grain may also be shipped by rail at a normal loading rate of 1,900 bushels per hour. Grain may be received either by rail or water at a normal speed of 1,900 bushels per hour from cars and at a rate of 2,500 bushels per hour from vessels. The elevator is served by the Big Four Railroad, the connections comprising three tracks at the elevator with a car-storage capacity of nine cars.

FAIRPORT, OHIO

Fairport is located at the mouth of the Grand River, on Lake Erie, 33 miles by water easterly from Cleveland, Ohio.

An elevator used mainly in the transfer of grain from vessels to cars is located in west Fairport on the west bank of the Grand River. This elevator, of 1,000,000 bushels maximum capacity, constructed of timber and corrugated iron, is owned by the Fairport Warehouse & Elevator Co., and operated by the Armour Grain Co. For unloading, the elevator is equipped with one marine leg, normal capacity 10,000 bushels per hour. Cars are loaded by means of four spouts, each having a normal rate of 3,000 bushels per hour. The facilities are so arranged as to permit the loading of water carriers at a speed of 8,000–10,000 bushels per hour. This movement, however, seldom takes place, due to the fact that practically all shipments are made by rail, the grain being consigned to Baltimore, Md., for export.

The rail connections, owned by the Baltimore & Ohio Railroad, consist of two tracks at the elevator, capacity 48 cars, with an adjacent car storage yard of 200–300 cars capacity.

ERIE, PA.

Erie is located on Presque Isle Bay, formed by Presque Isle Peninsula, on the south shore of Lake Erie, 78 miles by water westerly from Buffalo, N. Y.

The grain-handling facilities consist of one steel and concrete elevator of 1,058,000 bushels maximum capacity, owned by the Pennsylvania Railroad Co. and operated by the Jenkins Elevator.

Grain is received by vessel and car, although the main function of this elevator is the transferring of grain from vessel to car. For unloading vessels, there are two marine legs with a normal capacity of 26,000 bushels per hour, while cars are unloaded at a normal rate of 6,000 bushels per hour. All grain is shipped by rail, and cars are

loaded at a rate of 16,000 bushels per hour, practically all of the grain being destined to the Atlantic seaboard for export.

The elevator is served by the Pennsylvania Railroad, the connections consisting of four tracks at the elevator, capacity 100 cars and a storage yard nearby capable of handling 120 cars, in addition to an adjacent classification yard, capacity 200–300 cars.

BUFFALO, N. Y.

Buffalo is located at the eastern end of lake Erie and marks the present easterly limit of deep-water navigation on the American side of the Great Lakes. This port is the most important grain transfer point on the lower lakes. Grain is shipped via Welland Canal, barge canal, and by rail, hence the important function of the several elevators is to transfer the grain, brought down from the head of the Lakes, from the deeper-draft vessels to the carriers operating in the above-cited routes.

Owing to the originally unprotected lake front, the water terminals, of which grain elevators comprise the greatest number, naturally were first constructed along the Buffalo River and later along the city ship canal and connecting basins. The first grain elevators were built wholly of wood. This type has almost entirely disappeared, a large number having been destroyed by fire. The remaining ones are the Reliance, Marine (B), and Seneca. The next type was the steel tank, such as the Monarch, Great Eastern, Electric, Dakota, and Mutual. Then followed the reinforced concrete type, such as the Kellogg, Transit, American Malting Co., Dellwood, Superior, Concrete Central, Connecting Terminal, and Frontier elevators. All of these elevators make rail and canal deliveries.

Following is a table showing the physical data, pertaining to the elevators at this port:

GRAIN ELEVATORS

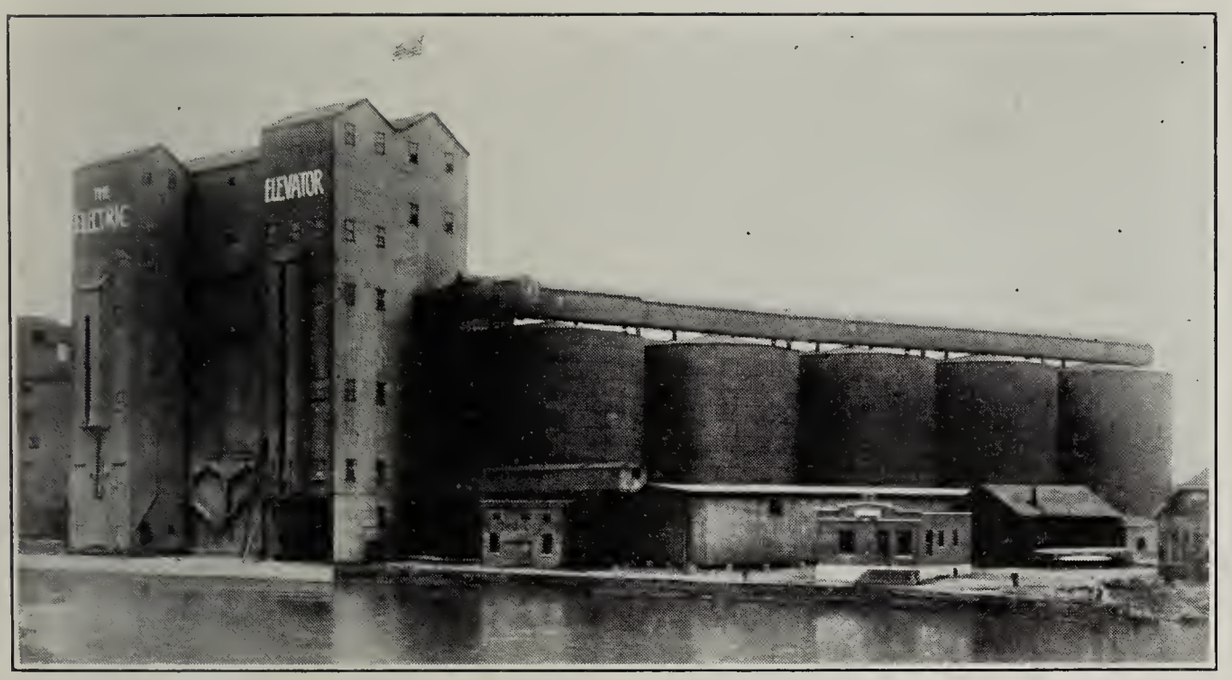
TABLE No. 136.—*Port of Buffalo, N. Y.*

Name or number	Reliance
Owner	Evans Elevator and Grain Corp.
Operator	Do.
Exact location	Evans Slip.
Type of construction	Wood.
Use	Transfer.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	550,000.
Normal operating capacity	315,000.
Number of bins	111.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,000.
Elevator to ship	6,000.
Ship to elevator	8,000.
Elevator to car	5,000–6,000.
Elevator to barge or lighter	6,000.
Equipment for loading and unloading	1 marine leg, 2 car spouts, 2 canal spouts.
Other equipment (cleaning, drying, etc.)	None.
Name of railroad connecting	New York, Central.
Tracks at elevator:	
Number	1.
Capacity, cars	6.
Supporting yards	New York Central yards.
Distance from elevator	Near by.

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

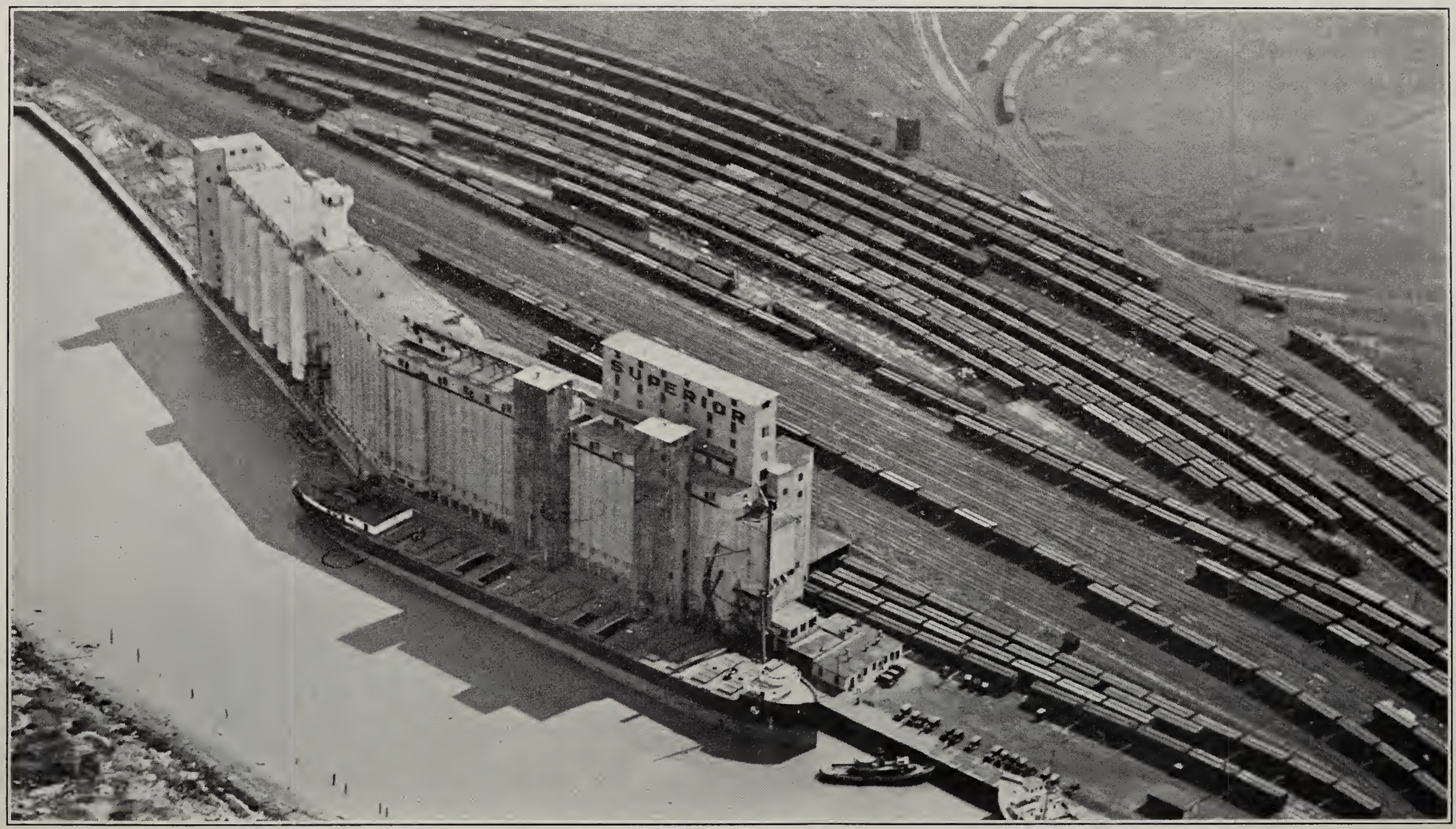
Name or number	Monarch
Owner	Monarch Elevator Corp.
Operator	Geo. J. Meyer Malt & Grain Corp.
Exact location	Evans Slip.
Type of construction	Steel.
Use	Transfer.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	500,000.
Normal operating capacity	450,000.
Number of bins	46.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3,500.
Elevator to ship	6,000.
Ship to elevator	10, 000.
Elevator to car	6,000–8,000.
Elevator to barge or lighter	6,000.
Equipment for loading and unloading	1 marine leg; 1 car spout; 1 canal spout; 1 receiving scale, 300 bushels capacity; 1 shipping scale, 500 bushels capacity. 1 single car pit; 1 receiving leg.
Other equipment (cleaning, drying, etc.)	1 oat clipper, 1 wheat clcaner.
Name of railroad connecting	New York Central.
Tracks at elevator:	
Number	1.
Capacity, cars	6–8.

Name or number	Concrete Central
Owner	Eastern Grain Elevator Corp.
Operator	Do.
Exact location	Buffalo River.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth	21.
Storage capacity, bushels:	
Maximum	4,500,000.
Normal operating capacity	4,100,000.
Number of bins	268.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	36,000–40,000.
Elevator to ship	72,000.
Ship to elevator	80,000–90,000.
Elevator to car	80,000.
Elevator to barge or lighter	72,000.
Equipment for loading and unloading	4 marine legs; 8 car spouts; 4 canal spouts; 7 shipping scales, 2,000 bushels capacity; 3 receiving scales, two 400 and one 1,000 bushels capacity; 6 double car pits.
Other equipment (cleaning, drying, etc.)	1 dryer, 1,200–1,500 bushels capacity; 1 blower, 12,000 bushels capacity per hour; 2 oat clippers; 2 receiving separators.
Name of railroad connecting	New York Central.
Tracks at elevator:	
Number	5.
Capacity, cars	100.
Supporting yards	New York Central yards.
Distance from elevator	Near by.
Capacity, cars	200.



ELECTRIC GRAIN ELEVATOR, BUFFALO, N. Y. (CAPACITY, 2,000,000 BUSHELS)

CONCRETE CENTRAL GRAIN ELEVATOR, BUFFALO N. Y. (CAPACITY, 4,500,000 BUSHELS)



SUPERIOR ELEVATOR, LOCATED ON SOUTH BANK OF BUFFALO RIVER (CAPACITY, 3,700,000 BUSHELS)

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Canadian Pool
Owner	Saskatchewan Pool Elevators (Ltd.), Regina, Saskatchewan.
Operator	Do.
Exact location	Buffalo outer harbor.
Type of construction	Concrete and steel.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	2,000,000.
Normal operating capacity	1,900,000.
Number of bins	154.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	20,000.
Elevator to ship	30,000.
Ship to elevator	35,000.
Elevator to car	40,000.
Elevator to barge or lighter	25,000.
Equipment for loading and unloading	3 legs and scales, 4 car spouts, 2 canal spouts, 2 movable marine towers.
Other equipment	None.
Name of railroad connecting	Lehigh Valley.
Tracks at elevator:	
Number	4.
Capacity, cars	60.
Supporting yards	3 tracks, about 85 cars each.
Distance from elevator	1,000 yards.

Name or number	Superior
Owner	Superior Elevator Co.
Operator	Superior Forwarding Co.
Exact location	Buffalo River.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	3,700,000.
Normal operating capacity	3,000,000.
Number of bins	248.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	7,000.
Elevator to ship	20,000–30,000.
Ship to elevator	28,000.
Elevator to car	25,000.
Elevator to barge or lighter	35,000.
Equipment for loading and unloading	3 marine legs, 4 car spouts, 2 canal spouts, 2 receiving scales, 400 bushels capacity, 6 shipping scales, 2,000 bushels capacity, 6 double car pits.
Other equipment (cleaning, drying, etc.)	1 dryer, 1,200–1,500 bushels capacity; 3 oat clippers, 2 receiving separators.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	5.
Capacity, cars	113.
Supporting yards	Buffalo Creek Railroad yards.
Distance from elevator	Near by.

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Dellwood
Owner	Archer Daniels Midland Co.
Operator	Do.
Exact location	Buffalo River at Hamburg Turnpike.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	1,700,000.
Normal operating capacity	1,400,000.
Number of bins	60.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000.
Elevator to ship	30,000.
Ship to elevator	30,000.
Elevator to car	30,000.
Elevator to barge or lighter	30,000.
Equipment for loading and unloading	2 marine legs; 2 car spouts; 2 canal spouts; 2 receiving scales, 400 bushels capacity; 2 shipping scales, 1,200–1,500 bushels capacity; 1 shipping scale, 500 bushels capacity; 1 double car pit.
Other equipment (cleaning, drying, etc.)	Flax cleaners.
Name of railroad connecting	Buffalo Creek and Pennsylvania.
Tracks at elevator:	
Number	5.
Capacity, cars	32–36.
Supporting yards:	
Number	2.
Distance from elevator	Near by.
Capacity, cars	15.

Name or number	American
Owner	American Elevator and Warehouse Co., Inc.
Operator	Do.
Exact location	Buffalo River.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	2,500,000.
Normal operating capacity	2,000,000.
Number of bins	81.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	10,000.
Elevator to ship	22,000.
Ship to elevator	36,000.
Elevator to car	22,000.
Elevator to barge or lighter	22,000.
Equipment for loading and unloading	4 marine legs; 2 car spouts; 2 canal spouts; 2 receiving scales, 400 bushels capacity; 2 shipping scales, 1,000 bushels capacity.
Other equipment (cleaning, drying, etc.)	Well equipped.
Name of railroad connecting	Buffalo Creek and Pennsylvania.
Tracks at elevator:	
Number	4.
Capacity, cars	32.

TABLE NO. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Electric
Owner	Electric Grain Elevator Co.
Operator	Do.
Exact location	Buffalo River.
Type of construction	Steel and steel.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	2,000,000.
Normal operating capacity	1,700,000.
Number of bins	24.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000–2,500.
Elevator to ship	10,000–20,000.
Ship to elevator	20,000.
Elevator to car	20,000.
Elevator to barge or lighter	10,000–20,000.
Equipment for loading and unloading	2 marine legs; 2 car spouts; 2 canal spouts; 2 receiving scales, 250 bushels capacity; 2 car shipping scales, 1,600 bushels capacity; 1 vessel shipping scale, 500 bushels capacity; 1 single car pit.
Other equipment (cleaning, drying, etc.)	1 receiving separator, 12,000 bushels capacity per hour.
Name of railroad connecting	Buffalo Creek and Pennsylvania.
Tracks at elevator:	
Number	6.
Capacity, cars	60.
Supporting yards:	
Distance from elevator	Near by.

Name or number	Nisbet
Owner	Nisbet Elevator Corporation.
Operator	Eastern Grain Elevator Corporation.
Exact location	Buffalo River.
Type of construction	Reinforced concrete.
Use	Storage and transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	3,000,000.
Normal operating capacity	2,500,000.
Number of bins	105.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	6,000.
Elevator to ship	30,000.
Ship to elevator	40,000.
Elevator to car	40.000.
Elevator to barge or lighter	30,000.
Equipment for loading and unloading	2 elevator legs; 2 loading legs to cars; 1 loading spout to barges or vessels; 1 unloading pit, car to elevator.
Other equipment	Grain dryer.
Name of railroad connecting	Erie R. R.
Tracks at elevator:	
Number	2.
Capacity, cars	32.
Supporting yards:	
Distance from elevator	About ¼ mile.

Name or number	Lake and rail
Owner	International Milling Co.
Operator	Do.
Exact location	Foot of Childs Street.
Type of construction	Concrete.
Use	Transfer.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	3,500,000.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	4,500.
Elevator to ship	35,000.
Ship to elevator	35,000.
Elevator to car	35,000.
Elevator to barge or lighter	20,000.
Equipment for loading and unloading	2 marine legs, 1 car spout, 6 canal spouts.
Other equipment	None.
Name of railroad connecting	Pennsylvania R. R. Co.
Tracks at elevator:	
Number	4.
Capacity, cars	36.
Supporting yards:	
Distance from elevator	Near by.

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Transit
Owner	A. J. Wheeler Co.
Operator	A. J. Wheeler Co., C. E. Pierce, manager.
Exact location	Buffalo River.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	750,000.
Normal operating capacity	675,000.
Number of bins	33.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	5,000.
Elevator to ship	10,000.
Ship to elevator	12,500.
Elevator to car	10,000.
Elevator to barge or lighter	10,000.
Equipment for loading and unloading	1 marine leg; 1 car spout; 1 canal spout; 1 receiving scale, 300 bushels capacity; 1 shipping scale, 500 bushels capacity.
Other equipment (cleaning, drying, etc.)	1 receiving separator, 7,000 bushels capacity per hour.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	1.
Capacity, cars	24.

Name or number	Kellogg
Owner	Spencer Kellogg & Sons (Inc.).
Operator	Godfrey Morgan, manager.
Exact location	Buffalo River at Michigan Street.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	1,200,000.
Normal operating capacity	1,000,000.
Number of bins	46.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,000.
Elevator to ship	25,000.
Ship to elevator	18,000–22,000.
Elevator to car	9,000.
Elevator to barge or lighter	25,000.
Equipment for loading and unloading	2 marine legs; 2 car spouts; 2 canal spouts; 2 receiving scales, 300-bushel capacity; 2 shipping scales, 1,600-bushel capacity; 1 shipping scale, 2,000-bushel capacity; 1 special car receiving scale, 500-bushel capacity; 2 car pits.
Other equipment (cleaning, drying, etc.)	Partially equipped to clean at rate of 10,000 bushels per hour.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	2.
Capacity, cars	16.
Supporting yards	None.

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Marine "A"
Owner	Marine Elevator Co.
Operator	Do.
Exact location	City ship canal.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	2,100,000.
Normal operating capacity	2,050,000.
Number of bins	63.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	20 cars; 8 hours.
Elevator to ship	30,000.
Ship to elevator	40,000.
Elevator to car	40,000.
Elevator to barge or lighter	30,000.
Equipment for loading and unloading	2 marine legs, 2 loading spouts.
Other equipment	1 cleaning machine, 1 clipping machine.
Name of railroad connecting	Pennsylvania.
Tracks at elevator:	
Number	4.
Capacity, cars	5.
Supporting yards:	
Distance from elevator	Near by.

Name or number	Marine B (old Marine)
Owner	Marine Elevator Co.
Operator	Do.
Exact location	Buffalo River.
Type of construction	Wood with slate and corrugated iron covering.
Use	Transfer.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	700,000.
Normal operating capacity	500,000.
Number of bins	144.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,800.
Elevator to ship	8,000.
Ship to elevator	1,700.
Elevator to car	7,500.
Elevator to barge or lighter	8,000.
Equipment for loading and unloading	2 marine legs, 1 car spout, 2 canal spouts, 1 receiving scale, 1 car pit.
Other equipment (cleaning, drying, etc.)	None.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	2.
Capacity, cars	8.
Supporting yards:	
Number	2.
Distance from elevator	Near by.
Capacity, cars	20.

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Great Eastern
Owner	Buffalo Elevator, Inc.
Operator	Do.
Exact location	Buffalo River.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	2,500,000.
Normal operating capacity	2,000,000.
Number of bins	79.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,500.
Elevator to ship	17,500.
Ship to elevator	20,000.
Elevator to car	10,000.
Elevator to barge or lighter	17,500.
Equipment for loading and unloading	2 marine legs; 2 car spouts; 2 canal spouts; 2 receiving scales, 200 bushels capacity; 2 shipping scales, 800 bushels capacity; 1 car pit.
Other equipment (cleaning, drying, etc.)	1 receiving separator; 1 cleaner, 8,000 bushels capacity per hour.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	1.
Capacity, cars	5.
Supporting yards:	
Number	2.
Distance from elevator	Near by.
Capacity, cars	40.

Name or number	Frontier
Owner	Frontier Mill & Elevator Co.
Operator	Do.
Exact location	City ship canal and Michigan Street.
Type of construction	Concrete.
Use	Private; no transshipping of grain.
Depth of water in berth (feet)	21.
Storage capacity, bushels:	
Maximum	4,750,000.
Normal operating capacity	4,500,000.
Number of bins	122.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	3 cars per hour.
Elevator to ship	20,000.
Ship to elevator	40,000.
Elevator to car	3 cars per hour.
Elevator to barge or lighter	15,000.
Equipment for loading and unloading	2 marine legs, 1 loader (to ship), 1 rail unloading tower, 1 loader (to cars).
Other equipment	None.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	4.
Capacity, cars	15.
Supporting yards	Turnpike.
Distance from elevator	2 miles.

TABLE No. 136.—*Port of Buffalo, N. Y.*—Continued

Name or number	Dakota
Owner	Buffalo Elevators (Inc.).
Operator	Do.
Exact location	City ship canal.
Type of construction	Steel-concrete foundation.
Use	Transfer.
Depth of water in berth feet	22
Storage, capacity bushels:	
Maximum	1,250,000.
Normal operating capacity	1,125,000.
Number of bins	153.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	2,500.
Elevator to ship	10,000.
Ship to elevator	20,000.
Elevator to car	15,000.
Elevator to barge or lighter	10,000.
Equipment for loading and unloading	2 marine legs; 1 car pit; 2 car spouts; 1 canal spout; 2 receiving scales, 200 bushels capacity; 1 special car receiving scale, 250 bushels capacity; 2 shipping scales, 500 bushels capacity; 1 special vessel shipping scale, 250 bushels capacity.
Other equipment (cleaning, drying, etc.)	None.
Name of railroad connecting	Buffalo Creek.
Tracks at elevators:	
Number	2.
Capacity, cars	15–20.
Supporting yards:	
Number	6.
Distance from elevator	Buffalo Creek R. R. yards nearby.
Capacity, cars	40–50.

Name or number	Mutual
Owner	Island Warehouse Corporation.
Operator	Eastern Grain Elevator Corporation.
Exact location	City ship canal near Michigan Street.
Type of construction	Brick and steel.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	2,700,000.
Normal operating capacity	2,500,000.
Number of bins	138.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	1,600.
Elevator to ship	15,000.
Ship to elevator	25,000.
Elevator to car	15,000.
Elevator to barge or lighter	15,000.
Equipment for loading and unloading	3 marine legs; 8 car spouts; 1 canal spout; 1 vessel shipping scale, 1,200 bushels capacity; 9 car shipping scales, 1,200 bushels capacity; 1 single car pit.
Other equipment (cleaning, drying, etc.)	None.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	2.
Capacity, cars	28.
Supporting yards:	
Number	3.
Distance from elevator	Near by.
Capacity, cars	90.

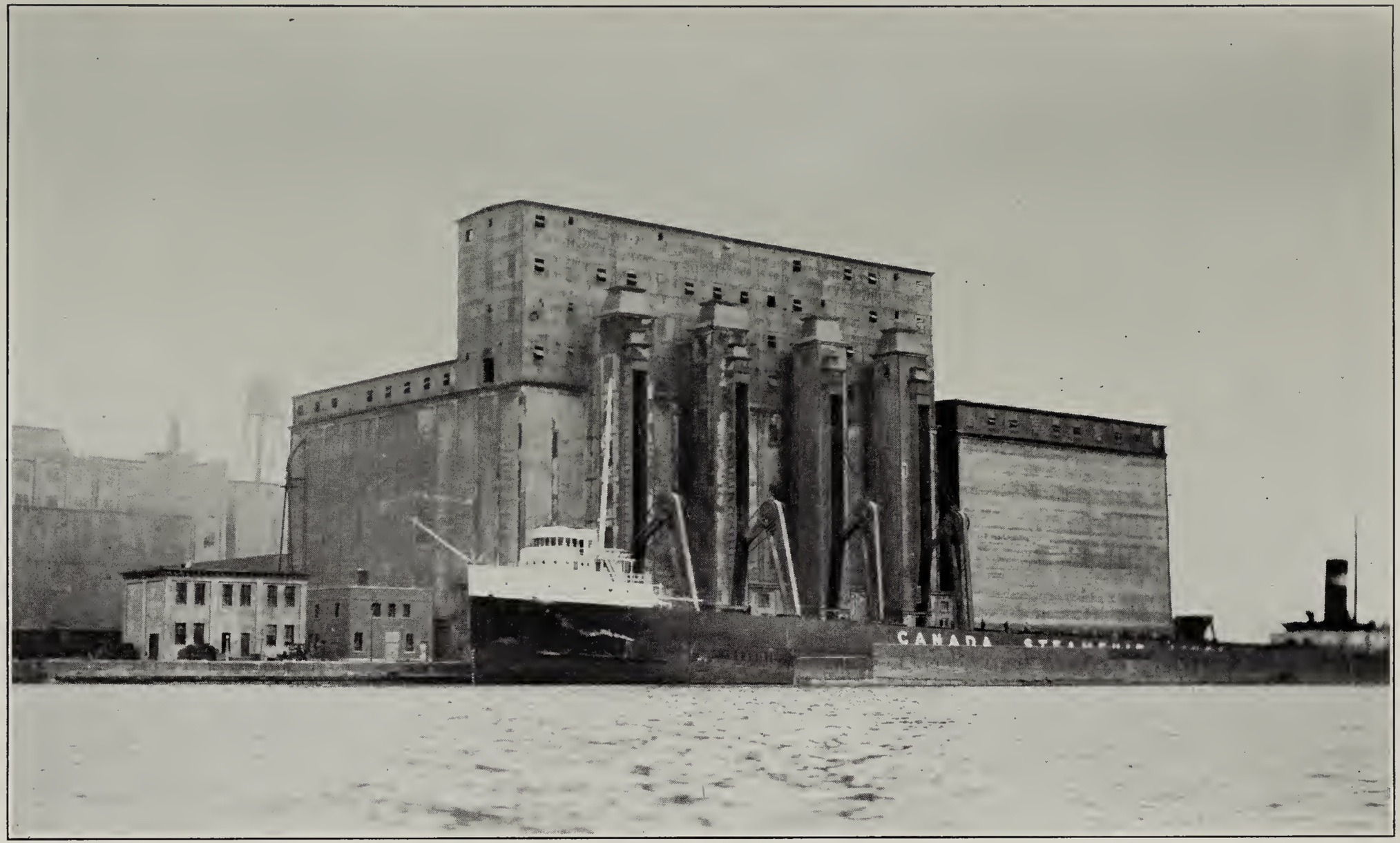
TABLE No. 36.—*Port of Buffalo, N. Y.*—Continued

Name or number	Seneca
Owner	Seneca Elevator Co.
Operator	Do.
Exact location	City ship canal.
Type of construction	Timber.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	1,000,000.
Normal operating capacity	950,000.
Number of bins	96.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	5,000.
Elevator to ship	80,000.
Ship to elevator	12,000.
Elevator to car	15,000.
Elevator to barge or lighter	80,000.
Equipment for loading and unloading	1 marine leg; 4 car spouts; 2 canal spouts; 1 receiving scale, 350 bushels capacity; 2 shipping scales, 1,000 capacity; 1 car pit.
Other equipment (cleaning, drying, etc.)	None.
Name of railroad connecting	Buffalo Creek.
Tracks at elevator:	
Number	2.
Capacity, cars	25.
Supporting yards:	
Number	Buffalo Creek Railroad yards.
Distance from elevator	Near by.

Name or number	Connecting terminal
Owner	Connecting Terminal Railroad Co.
Operator	Atlas Grain Elevating Co.
Exact location	City ship canal.
Type of construction	Steel and concrete.
Use	Transfer.
Depth of water in berth (feet)	23.
Storage capacity, bushels:	
Maximum	1,048,000.
Normal operating capacity	920,000.
Number of bins	70.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	15,000.
Elevator to ship	25,000.
Ship to elevator	25,000.
Elevator to car	28,000.
Elevator to barge or lighter	25,000.
Equipment for loading and unloading	2 marine legs; 2 car spouts; 1 canal spout; 2 receiving scales, 400 bushels capacity; 3 shipping scales, 2,000 bushels capacity; 1 single car pit.
Other equipment (cleaning, drying, etc.)	Can partially clean grain at rate of 12,000 bushels per hour.
Name of railroad connecting	Buffalo Creek, and Pennsylvania.
Tracks at elevator:	
Number	12—cars—245.
Supporting yards:	
Number	7.
Distance from elevator	Near by.
Capacity, cars	150.

PORT COLBORNE

Port Colborne Harbor is situated at the Lake Erie entrance to the Welland Canal. It is formed by two breakwaters, the westerly, 4,424 feet long, with a spur extending 2,060 feet to the ship channel, and the easterly, 2,460 feet long. This improvement affords protection for an area of about 70 acres. The entrance to the canal is between two piers. On the westerly pier are located the elevators of the Dominion Government and the Maple Leaf Milling Co. The harbor and the berths at the elevator have a depth of 22 feet.



GOVERNMENT ELEVATOR, PORT COLBORNE, ONTARIO

Port Colborne is the most important point for the transfer of grain from large lake carriers to small carriers suitable for navigating the Welland and St. Lawrence River Canals. The Dominion Government elevator is of reinforced concrete and steel construction and has 375 bins and a storage capacity of 3,000,000 bushels. There are four marine legs having a rated capacity of 20,000 bushels per hour each. For loading small vessels there are nine spouts with rated capacity of 20,000 bushels per hour each, but the normal total capacity from elevator to small vessels is 60,000 bushels per hour. While the elevator is used principally for transferring from the large lake carrier to the small canal carrier, some shipments are made by cars, and the facilities are adequate for loading about 150 cars per day. There is one track at the elevator with a capacity of 12 cars, but adjacent tracks have a capacity for 200 cars. The tracks belong to the Canadian National Railways, but there are connections with the Niagara, St. Catherines & Toronto Railroad, the Michigan Central and the Toronto, Hamilton & Buffalo Railway.

LAKE ONTARIO AND ST. LAWRENCE RIVER PORTS

KINGSTON

Kingston is situated at the northeast end of Lake Ontario, at the mouth of the Cataraqui River. This port formerly had three grain elevators with a total capacity of 1,800,000 bushels, and was an important point for the transfer of grain from vessels passing through the Welland Canal to the small types of canal boats suitable for use on the then existing St. Lawrence canals, which had a depth of 9 feet. With the deepening of the St. Lawrence canals to 14 feet, the transfer business at this place gradually ceased.

At the present time there is one elevator at Kingston, owned and operated by James Richardson & Sons (Ltd.), which has a storage capacity of 200,000 bushels. Grain is received from and shipped by vessel at a rate of 6,000 bushels per hour. The elevator also has facilities for handling grain to and from cars. It is used chiefly for supplying the local territory adjacent to Kingston.

Plans have been formulated for the construction of a private transfer elevator to be located about 10 miles above Kingston on Lake Ontario with a storage capacity of 7,000,000 bushels.

OSWEGO, N. Y.

This harbor is situated on the south shore of Lake Ontario near its easterly end 136 miles east of the mouth of the Niagara River. It is located at the mouth of the Oswego River, is the Lake Ontario terminus of the New York State Barge Canal, and will occupy a strategic position after the opening of the New Welland Canal, now

scheduled for 1930, providing access for all deep draft lake vessels to Lake Ontario.

There is one elevator at this port, a modern steel-concrete structure owned by the State of New York and situated at the West Side Barge Canal Terminal on the State pier in the outer harbor west of the mouth of the Oswego River. It is equipped with two movable marine unloading towers on its easterly side and with loading devices for canal boats and other vessels on its westerly side.

The following table gives the physical data pertaining to the elevator:

GRAIN ELEVATORS

TABLE NO. 137.—*Port of Oswego, N. Y.*

Name or number	New York State Elevator
Owner	State of New York.
Operator	Do.
Exact location	Northerly end of lake terminal pier.
Type of construction	Concrete.
Use	Transfer.
Depth of water in berth (feet)	22–26.
Storage capacity, bushels:	
Maximum	1,038,000.
Normal operating capacity	975,000.
Number of bins	63.
Normal loading and unloading capacity (bushels per hour):	
Car to elevator	32,000.
Elevator to ship	20,000.
Ship to elevator	32,000.
Elevator to car	20,000.
Elevator to barge or lighter	20,000.
Equipment for loading and unloading	2 marine legs, 1 loading spout, 2 instore scales, 3 outstore scales.
Other equipment	None.
Name of railroad connecting	Delaware, Lackawanna & Western.
Tracks at elevator:	
Number	2.
Capacity, cars	16.

PRESCOTT, ONTARIO

Prescott is situated on the St. Lawrence River, just above the uppermost canal, known as the Galops Canal.

The elevator formerly used for the purpose of transferring grain from boats passing through the Welland Canal to lighter draft boats for movement on the St. Lawrence River has been dismantled.

The Canadian Government has selected the port of Prescott on the St. Lawrence River, practically opposite Ogdensburg, N. Y., as the most suitable location for grain terminal facilities. Upon the completion of the Welland Ship Canal, with a depth of 30 feet of water over the mitre sills, vessels of the largest size will be able to navigate Lake Ontario, and reach Prescott.

Work is now in progress on wharf facilities upon which will be located a grain elevator of 5,400,000 bushels storage capacity. The plant will have four unloading towers and provision will be made for two of the largest upper lakes freighters to be unloaded at the same time, for four Welland Canal size steamers to be loaded at the same

time, and for railway cars to be loaded on four tracks, all these operations to be concurrent.

OGDENSBURG, N. Y.

Ogdensburg is located on the south bank of the St. Lawrence River, 62 miles by water from the easterly end of Lake Ontario and directly opposite Prescott. The grain handling facilities consist of a modern steel and concrete elevator of 700,000 bushels maximum capacity.

This elevator is equipped with one marine leg for unloading from ship to elevator at a normal rate of 15,000 bushels per hour. Although some grain is loaded into St. Lawrence River boats at a normal capacity of 8,000 bushels per hour, the main business of this elevator is to transfer grain from vessel to car, this movement being carried on at a normal rate of 8,000 bushels per hour.

The elevator is owned and served by the Rutland Railroad, the connections consisting of two tracks leading directly into the car shed, with a capacity of 20 cars, with car storage yards adjacent. Practically all of the grain shipped by rail is destined for consumption at various New England points.

MONTREAL

Montreal is situated at the head of the improved ship channel of the St. Lawrence River. The minimum width of the channel between Quebec and Montreal is 450 feet, while below Quebec it is 1,000 feet. The channel to Montreal has been dredged to a depth of 30 feet below extreme low water of 1897.

The harbor is divided into three sections: First, the upper section south of the Lachine Canal; second, the central harbor; and third, the lower section. Opposite the city are three islands known as Ile Verte, Ile Ste. Helene, and Ile Ronde. The main ship channel passes on the west side of these islands.

By virtue of its position at the head of ocean navigation, Montreal has easily maintained her supremacy among the ports of Canada. Not only does it handle the larger share of the Canadian traffic, but also a large amount of American traffic, including not only grain, but miscellaneous freight of all kinds moving to and from the Chicago district and other points in the West.

The port is served by the Canadian Pacific and the Canadian National Railways, which together now constitute the two important trunk line systems of Canada. It is the lower terminus of the St. Lawrence canals, by means of which it receives large quantities of grain and other commodities.

The entire water front of the port is controlled by the Montreal Harbor Commission which operates the facilities, including a belt line railway connecting them with the rail carriers. This control

has enabled the port to proceed systematically with a comprehensive plan of port development. One of the outstanding features is the provision made for supplying grain to vessels at their regular berths by means of an extensive system of galleries communicating with the harbor commission's elevators. While the maintenance and operation of this gallery system constitutes an added expense in the loading out of grain as compared with elevators having loading spouts directly from the shipping bins, it is an expense which is justified by the advantages it possesses in lessening the time and expense of the ship in port.

Prior to the construction of Elevator No. 1, in 1902, Montreal delivered grain to vessels at their berths by means of floating elevators, of which 17 were in operation, but these have since been discarded.

The four elevators at the port of Montreal are as follows:

	Capacity (bushels)
Elevator "B"	3, 500, 000
Harbor commissioners grain Elevator No. 1	4, 000, 000
Harbor commissioners grain Elevator No. 2	2, 662, 000
Harbor commissioners grain Elevator No. 3 and Annex	5, 000, 000
Total	15, 162, 000

The following table gives detailed information regarding each elevator:

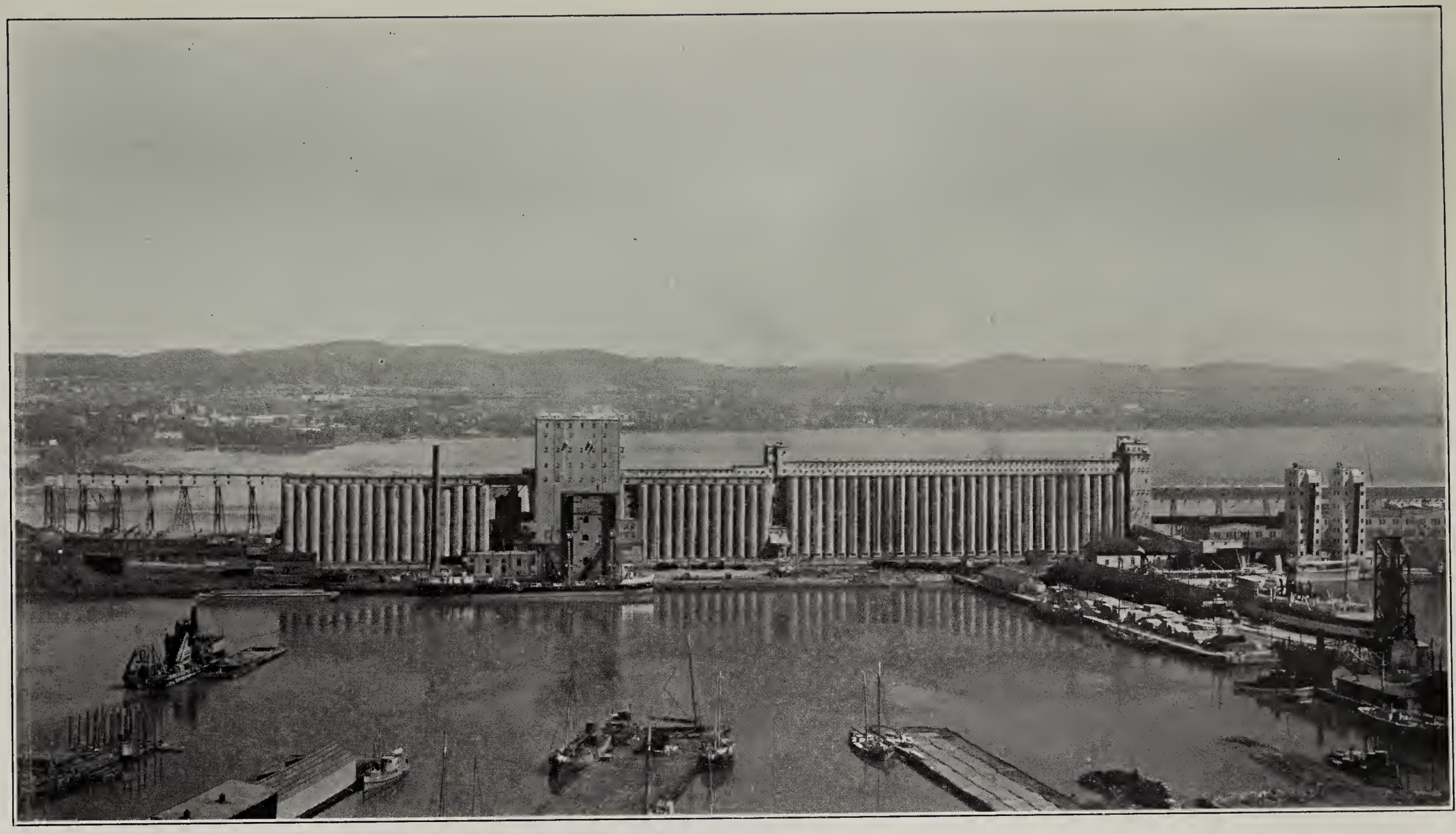
GRAIN ELEVATORS

TABLE NO. 138—*Port of Montreal, Province of Quebec*

Name or number	Elevator "B"
Owner	Canadian Government.
Operator	Harbor commissioners.
Exact location	Windmill Point.
Type of construction	Workhouse, steel; storage, cement.
Use	Transfer from canal vessel and car to ocean vessel.
Depth of water in berth (feet)	30.
Storage capacity, bushels:	
Maximum	3,500,000.
Normal operating capacity	2,800,000.
Number of bins	243.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	26,000.
Elevator to ship	75,000.
Ship to elevator	20,000.
Elevator to car	16,000.
Equipment for loading and unloading (electrically operated)	Car dumper, 4 cars per hour; remote control.
Other equipment	Cleaner, 1,000 bushels per hour.
Name of railroad connecting	Canadian National.
Tracks at elevator:	
Number	3.
Capacity, cars	130.
Supporting yards	No railway yards specially set aside for use of elevators.

HARBOR COMMISSIONERS' ELEVATOR B, MONTREAL, QUEBEC (CAPACITY, 3,250,000 BUSHELS)

ANNEX TO HARBOR COMMISSIONERS' ELEVATOR NO. 3, MONTREAL, QUEBEC (CAPACITY OF ANNEX, 3,000,000 BUSHELS; TOTAL CAPACITY OF ELEVATOR, 5,000,000 BUSHELS)



HARBOR COMMISSIONERS' ELEVATOR, QUEBEC, PROVINCE OF QUEBEC (CAPACITY, 4,000,000 BUSHELS)

TRAVELING MARINE TOWERS, QUEBEC, PROVINCE OF QUEBEC

TABLE No. 138.—*Port of Montreal, Province of Quebec*—Continued

Name or number	Elevator No. 1
Owner	Canadian Government.
Operator	Harbor commissioners.
Exact location	Section 15.
Type of construction	Steel and concrete.
Depth of water in berth (feet)	29.
Storage capacity, bushels:	
Maximum	4,000,000.
Normal operating capacity	3,000,000.
Number of bins	307.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	8,000.
Elevator to ship	75,000.
Ship to elevator	24,000.
Elevator to car	32,000.
Equipment for loading and unloading (electrically operated)	Conveyor belts, spouts, and marine legs; car shakers; 6 cars per hour; remote control.
Other equipment	Cleaner, 1,000 bushels per hour.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator:	
Number	2.
Capacity, cars	40.

Name or number	Elevator No. 2
Owner	Canadian Government.
Operator	Harbor commissioners.
Exact location	Section 19.
Type of construction	Workhouse, cement; storage, cement.
Depth of water in berth (feet)	29.
Storage capacity, bushels:	
Maximum	2,662,000.
Normal operating capacity	2,000,000.
Number of bins	300.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	32,000.
Elevator to ship	160,000.
Ship to elevator	40,000.
Elevator to car	40,000.
Equipment for loading and unloading (electrically operated)	Car shakers; 6 cars per hour; local control.
Other equipment	Drier, 2,000 bushels wet grain in 24 hours.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator:	
Number	4.
Capacity, cars	160.

Name or number	Elevator No. 3
Owner	Canadian Government.
Operator	Harbor commissioners.
Exact location	Maisonneuve.
Type of construction	Concrete.
Depth of water in berth (feet)	29.
Storage capacity, bushels:	
Maximum	2,000,000.
Normal operating capacity	1,500,000.
Number of bins	232.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	40,000.
Elevator to ship	150,000.
Ship to elevator	48,000.
Elevator to car	12,000.
Equipment for loading and unloading (electrically operated)	Car dumper; 4 cars per hour; local control.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator:	
Number	4.
Capacity, cars	200.

TABLE NO. 138.—*Port of Montreal, Province of Quebec*—Continued

Name or number	Elevator No. 3 Annex
Owner	Canadian Government.
Operator	Harbor commissioners.
Exact location	Maisonneuve.
Type of construction	Concrete.
Depth of water in berth (feet)	29.
Storage capacity, bushels:	
Maximum	3,000,000.
Normal operating capacity	2,500,000.
Number of bins	154.
Normal loading and unloading capacity, bushels per hour:	
Car to elevator	40,000.
Elevator to ship	150,000.
Ship to elevator	48,000.
Elevator to car	50,000.
Equipment for loading and unloading (electrically operated)	Local control.
Name of railroad connecting	Canadian National and Canadian Pacific.
Tracks at elevator:	
Number	1.
Capacity, cars	40.

QUEBEC

This port is located on the St. Lawrence River at the estuary of the St. Charles River and is 180 miles from the entrance to the Gulf of St. Lawrence at Farther Point and 166 miles below Montreal. It is the largest port on tidewater on the St. Lawrence River and possesses exceptional facilities for the accommodation of the largest passenger and freight steamers. Quebec is 500 miles nearer Liverpool than New York. The facilities of the port include a modern grain elevator of 4,000,000 bushels capacity, fully equipped to handle grain received by rail or water and load into ocean carriers at the rate of 90,000 bushels per hour. It is owned by the Canadian Government and operated by the Quebec Harbor Commisson. It has four marine legs for unloading from lake barges, the total capacity being 40,000 bushels per hour. Two of the marine towers are of the movable type and barges can be unloaded at any stage of the tide. The car unloading capacity of the elevator exceeds 120 cars per day. A modern car shaker has been recently installed. The 4-belt grain shipping galleries extend for 2,600 feet on the St. Charles River frontage and five boats may be loaded at one time. A section of these galleries is provided with movable gantry grain loaders which facilitates the trimming of grain on the ship. Each loader has a capacity of 15,000 bushels per hour, the balance of the galleries being provided with direct spouts to the ship. These spouts are placed 60 feet apart. There is 35 feet of water at low tide at the grain shipping berths.

The elevator is fully equipped with the most modern equipment for cleaning and drying grain. The cleaner equipment having a capacity of 40,000 bushels per day and the drier 3,000 bushels per hour.

The movement of grain through the port of Quebec is increasing annually; and due to the favorable rail rate recently granted over the national transcontinental division of the Canadian National Railways,

which is the shortest rail route between the grain centers of the Canadian West and the Eastern Canadian seaports, the rail movement during the past few years has been to the full grain elevator storage capacity.

A modern cold-storage warehouse of 500,000 cubic feet capacity has been recently constructed, as also a fully equipped fish-freezing and storage house of 1,000,000 pounds storage capacity, which is developing a big fishing commerce on the St. Lawrence River and Gulf.

The port is also equipped with transit sheds having a total floor area of 500,903 square feet. These sheds are located at the various passenger and freight berths and several of the sheds are of the modern fire-proof type and are used by the Canadian Pacific *Empress* boats and other liners, which make their terminus at Quebec.

The extending of the port facilities to that section of the harbor of Quebec known as Wolfe's Cove has been found necessary, due to the annually increasing utilization of the present facilities and the advent of the new liners of the Canadian Pacific steamers, which necessitates berths having depths of water to 40 feet at low tide. The new dockage facilities have been under construction during the past few years and the first section will be available in 1931 for the new *Empress of Britain*, which will be put in operation during that season.

These new terminals at Wolfe's Cove will be fully equipped with the most modern port facilities for the handling of export traffic and all ocean berths will have 40 feet of water at low tide.

The port of Quebec possesses two graving docks and several marine railways. The larger graving dock has a length of 1,150 feet and a width of 120 feet and is capable of docking the largest vessels afloat. Modern repair shops are provided with these graving docks.

MODERN BULK FREIGHTER DISCHARGING A CARGO OF IRON ORE AT THE PLANT OF THE PITTSBURGH & CONNEAUT DOCK CO., CONNEAUT, OHIO (BATTERY OF FIVE 17-TON ELECTRIC UNLOADERS EMPLOYED; ONE 12-TON ELECTRIC TRANSFER BRIDGE ON THE RIGHT)

VI. THE ORE MOVEMENT

POSITION OF THE GREAT LAKES IN THE IRON AND STEEL INDUSTRY

The Great Lakes system and its immediate hinterland holds a unique position in the iron and steel industry of the United States. While the territory bordering on Lake Superior is probably the world's greatest developed body of iron ore, the territory adjacent to the lower lakes is noted for its iron and steel production. Thus the Lakes form the connecting link between raw material and finished product. Production of iron ore in the Lake Superior region for the year 1928 amounted to 52,517,175 gross tons, while its closest competitor was France, which, including Alsace-Lorraine, produced 50,119,906 gross tons during the same period. Besides being the largest producing region in the world it accounts for 84.4 per cent of all the ore mined in the United States, thus holding not only a paramount position in the domestic production but also in world production.

The importance of the Great Lakes in the development of this region can not be evaluated too highly as they have provided a natural means of carrying a bulky commodity of low value efficiently and cheaply to its point of consumption. During 1928 shipments from upper lake ports totaled 53,980,874 tons or 36 per cent of the total net tonnage moved via lake.

HISTORY OF DEVELOPMENT

The first discovery of the presence of iron in Michigan occurred in 1844 when a party of surveyors, noticing the variation of their magnetic needle, discovered iron ore near Teal Lake in Michigan. The first shipment of ore, however, did not take place until 1852 when six barrels were shipped to New Castle, Pa. Regular shipments of ore from the Marquette Range were not begun until 1856 when transportation by water became available, by the opening of a ship canal around the rapids of St. Mary's River at Sault Ste. Marie in 1855.

As the interest in Lake Superior ores increased, further discoveries were made and in 1884 the Menominee Range shipped its first regular cargo to Milwaukee. In 1884 the Gogebic and Vermilion Ranges became regular shippers of ore. In 1890 ore was discovered in what is now the Mesabi Range and was rapidly followed by further exploitation making this range the largest shipper of ore of any Lake

Superior Range, which is due to the ease with which it can be mined and the size of the ore bodies. The Cuyuna Range was the last of the Lake Superior Ranges to be developed. Low-grade magnetite ore was discovered in 1904 but regular shipments were not made until 1911.

MARQUETTE RANGE

The Marquette Range, in Marquette County, Mich., extends in a westerly direction from the city of Negaunee to the western end of Lake Michigamme, a distance of about 30 miles. In the vicinity of Negaunee and Ishpeming the iron formation outcrops in an area about 5 miles wide. West of Ishpeming it divides into a north and south limb, the north limb extending westerly to Michigamme and the south limb to Champion, at which point it turns to the south and extends in a narrow section to Republic. To the southeast of the Negaunee area is located the Cascade district and about 20 miles further in this direction is the Swanzy district which is entirely separated from the Marquette Range. However, from a mining and commercial standpoint these districts are included as a part of the Marquette Range. The range is served by three railroads, the Chicago & North Western; Duluth, South Shore & Atlantic; and the Lake Superior & Ishpeming Railroads. During the boom caused by the Civil War this range produced its more important early shipments. In 1872 the opening of the Republic, Michigamme, and Spur mines practically completed the prospecting in the Marquette district as known at present with minor exceptions.

The maximum depth to which the ore bodies extend has not been determined, but they have been found 2,500 feet and more down. The ores in this range are soft or hydrous hematites, hard hematites, and magnetites.

THE MENOMINEE RANGE

The Menominee Range embraces several different districts occupying disconnected areas of iron bearing formation. These are: The Menominee district, the Crystal Falls district, the Iron River district, the Felch Mountain district, and the Calumet and Sturgeon River districts, all in the State of Michigan, and the Florence district in the State of Wisconsin. The Menominee, Crystal Falls, and Iron River districts, are the most important commercially. These occupy disconnected areas in a section about 50 miles long from east to west and 35 miles wide from north to south. The Menominee, Florence, and Iron River districts, are located in the southern part of this area, with the other districts lying to the north.

The Marquette Range had been the sole producer of iron ore in the Lake Superior region for nearly 30 years when its first competitor, the Menominee Range, entered the field. The first practical dis-

covery of ore in Menominee County was made some time prior to 1867, but the first practical work in the way of development was not done until 1872. It was not until 1880, when the Menominee branch of the Chicago & North Western Railroad from Escanaba to Quinnesec was completed, that production began in earnest. The entry of the Chicago, Milwaukee & St. Paul Railroad in 1886 and the Wisconsin and Michigan Railroad in 1903, increased the output considerably. By 1882 the annual output of this range had reached the 1,000,000-ton mark, and in 1920 shipments reached a high mark of 6,570,000 tons but in the last few years the outputs of the Marquette and Menominee Ranges have been practically on a parity.

The ore bodies of this range extend to a depth of 1,500 feet or more. They range from a few feet to several hundred feet in thickness and vary from a few hundred to 3,000 feet in length. The ores are on the average somewhat lower in iron than those of the other ranges. Those of the Menominee district are usually bluish-black, purplish-red hematites. The ores of the Iron River and Crystal Falls districts are usually dark brown to black, crystallized limonites, or soft red hematites.

THE GOGEBIC RANGE

The Gogebic Range occupies a narrow belt about 80 miles long, extending in a westerly direction from eastern Gogebic County, Mich., to the Wisconsin State line, thence through Iron and Ashland Counties a short distance into Bayfield County, Wis. That part of the area lying in Michigan and the eastern 8 miles of the range in Wisconsin constitute the productive portion of this range.

The first shipment of ore was made in 1884 to Marquette, but the existence of ore in this range was known for a considerable time prior to its opening. Until 1887 there was a marked increase in production.

In the fall of 1887 the financial panic closed many mines; but the stronger companies weathered the storm and the production of ore increased steadily until 1890, when for a period of several years the shipments reflected the depressed and unstable conditions which affected the entire Lake Superior region. From that time there has been a steady increase, as a whole, in the production of this range. Shipments for the last decade have averaged 6,200,000 tons annually.

The ore bodies of this range vary greatly in size and shape, being several hundred feet in width and depth, and from several hundred to several thousand feet in length. Numerous bodies are found within a comparatively small area and may lie vertically one above the other, or occur at intervals across the formation. Developments extend to considerable depths and ore is known to exist at least 3,000 feet below the surface. These ores are soft red, partly dehydrated hematites with subordinate amounts of hard blue hematite.

THE VERMILION RANGE

The Vermilion Range is located in the northeastern part of Minnesota, in St. Louis, Lake, and Cook Counties. From the west end of Vermilion Lake it extends in a northeasterly direction to Gunflint Lake on the Canadian border. It is about 100 miles long and varies in width from 5 to 15 miles. Although mention is made of ore in this district as early as 1850, interest in this range was not aroused until the reported occurrence of ore in the vicinity of Vermilion Lake, in the sixties. The first exploration for iron ore in this district was made in 1875, at which time the deposits on Soudan Hill were discovered. Systematic and extensive efforts were made in the late seventies and early eighties to develop this iron ore. It was about this time that the Minnesota Iron Co. was organized, and all properties which were known to contain ore and great stretches of country which were in continuation of the ore range were purchased. In 1884 the Duluth & Iron Range Railroad was completed from Two Harbors to Tower, and at a later date this road was connected with Duluth 25 miles away. The first ore shipment was made in 1884, although the actual mining had been started some years before. Since that time the output of the Vermilion district has increased steadily.

The ore of this range is found as much as 2,000 feet below the surface. The outcrops are small. Due to the leaching out of the silica and other elements, and subsequent cross folding of the rock strata, the ores are found in hard and highly concentrated folds. The ores themselves are hard blue and red hematites, for the most part high in iron and low in moisture.

A comparison of the output of the Vermilion and Gogebic Ranges discloses an interesting contrast between centralized control, backed by adequate capital, in the Vermilion district, and competitive exploitation based on small undertakings and insufficient funds in the Gogebic district. Production in the latter is irregular, rising one season and sinking the next; the output of the Vermilion, on the other hand, climbs with a slow regularity which is surprising when one considers the variable conditions of the market in which it has to be sold.

THE MESABI RANGE

The Mesabi Range, which is located about 30 miles south of the Vermilion Range, extends in an easterly and westerly direction for about 100 miles. The eastern end lies between Duluth and the Vermilion Range. Iron was reported here as early as 1852, subsequent to which the great possibilities were determined by exploring parties.

The discovery of the "Biwabik" in 1891, together with the subsequent discovery of ore near the sites of the present towns of Virginia,

Eveleth, McKinley, Hibbing, and Iron Mountain, led to an inevitable rush of prospectors. As in other ranges transportation was inadequate, but in 1892 the Duluth, Missabe & Northern Railway was built to connect the Iron Mountain mine with the old Duluth & Winnepeg Railway (now the Eastern Railway of Minnesota, a part of the Great Northern system), at Stony Branch Junction, and was later extended to Duluth. In conjunction with this, a branch was built to Biwabik. About the same time the Duluth & Iron Range Railroad constructed a branch from its main line to the group of mines at that point. Both railroads were extended to the other mines within a short period. With the increased transportation facilities, the development of the range increased tremendously. The only considerable check occurred during the period of general financial depression in 1894, 1895, and 1896. To-day, after 35 years of development, this district is the greatest iron producer in the world.

The mines are shallow in comparison with the other Lake Superior bodies in which the ore lies in steep pitching troughs. The average depth here is about 250 feet. The ores are mostly soft hematites and limonites, varying in texture from fine to coarse and hard granular ores. In addition to the "Standard" direct shipping ores and the wash ores, large bodies of low grade magnetite ore are now being exploited on the extreme eastern end of the range. These deposits form an immense reserve of iron which will become more and more important as the higher grades approach exhaustion.

THE CUYUNA RANGE

The Cuyuna Range extends in a westerly direction from a point about 60 miles west of Duluth and 50 miles south of the Mesabi Range. It has two main subdivisions, the north and south ranges. The latter is the more extensive but the former which occupies a belt about 10 miles long and 5 miles wide, contains the most productive mines.

The drift mantle covering this range is from 80 to 250 feet thick and there are no outcroppings of ore, which accounts for its delayed discovery. It was located in 1897 by means of a dip needle. There were subsequent drillings, but the first shipment of ore was not made until 1911. Since that time, production has increased steadily and from present indications it bids fair to become an increasingly important source. Some of the deposits are shallow, while many extend to a considerable depth.

A wide variety is found in this range. Medium soft ores predominate but the hard ores are abundant, both types frequently occurring in the same bodies. They are usually non-Bessemer and run from reddish-blue and dark brown hematites to yellow ocher or limonite.

Manganiferous ores constitute a type of considerable importance and deserve particular mention, as their occurrence in this range is probably the most important in the United States. They are black, yellow, or brown, and vary in degree of hardness. The phosphorous varies considerably, but is usually quite high. The range is served by the Northern Pacific and Soo Line Railroads.

IRON ORE RESERVES IN THE LAKE SUPERIOR DISTRICT

The following table compiled from the records of the United States Bureau of Mines shows the estimated iron ore reserves inclusive of ore in the ground and in stock piles at the six ranges in the Lake Superior region from the year 1920 to 1928, inclusive. The estimates show that the Mesabi Range contains the greatest supply of iron ore in this region which if there are no further developments will last, at the present rate of production, about 37 years. The Menominee, Marquette, and Cuyuna Ranges contain the next greatest reserves, respectively. The total reserve has tended to be slightly irregular because of new discoveries, but in recent years there has been a steady decline in the reserve stocks so that now a rough estimate places the exhaustion of this present supply at 28 years.

TABLE No. 139.—*Estimated iron ore reserves in Lake Superior district*

[Quantities in long tons]

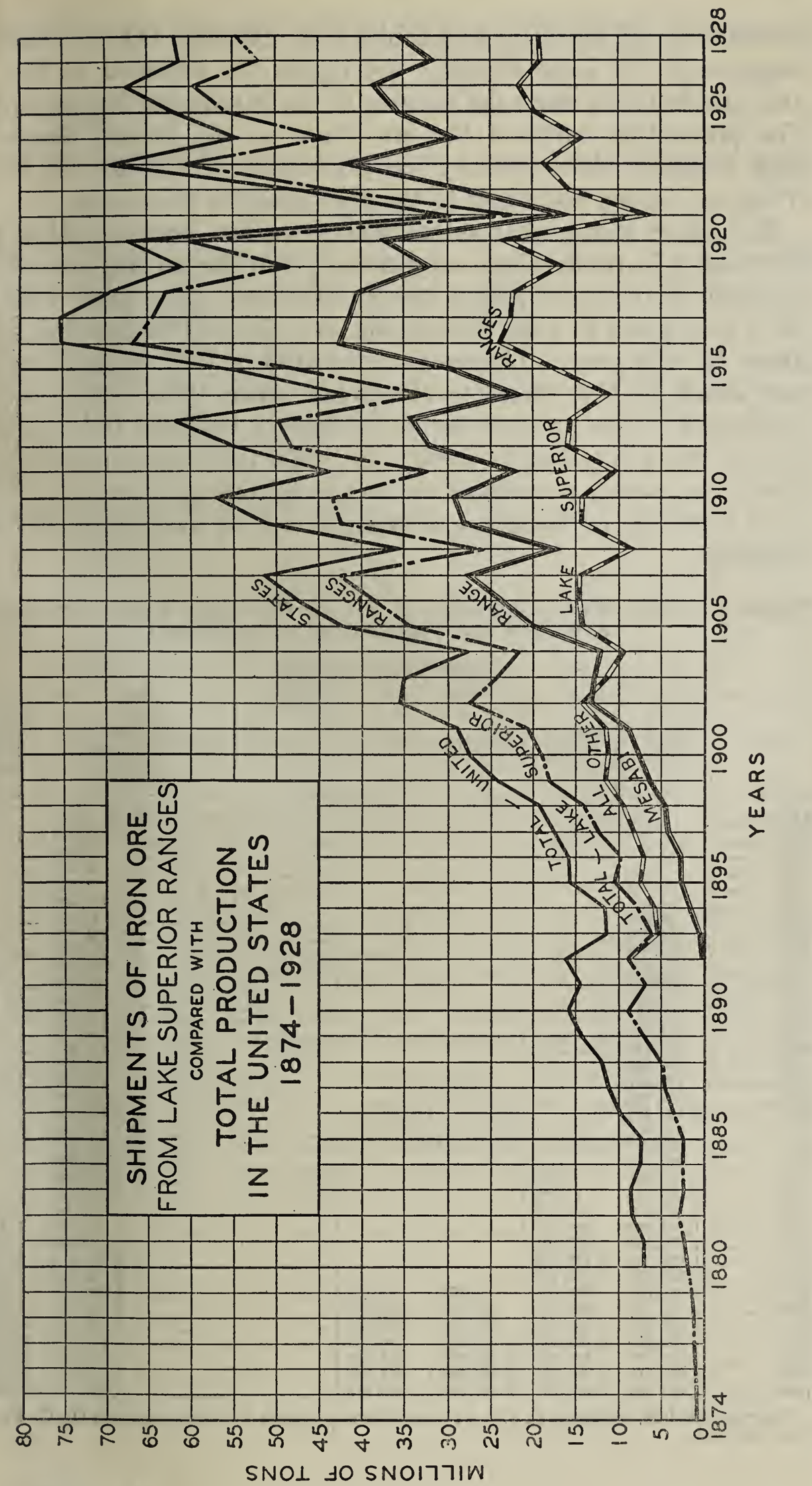
Range	1920	1921	1922	1923	1924
Mesabi	1,305,926,735	1,273,128,664	1,252,820,242	1,254,861,451	1,275,347,126
Vermilion	10,927,884	13,201,525	14,354,328	13,688,352	13,169,953
Cuyuna	24,819,959	25,080,590	29,485,159	43,041,100	46,121,021
Gogebic	64,563,003	64,964,666	62,405,146	58,314,512	54,949,558
Marquette	70,114,034	73,853,786	72,953,551	72,102,521	70,384,149
Menominee	63,929,438	65,311,868	64,386,025	66,409,915	66,555,393
Total	1,540,281,053	1,515,541,099	1,496,404,451	1,508,417,851	1,526,527,200

Range	1925	1926	1927	1928
Mesabi	1,250,086,347	1,233,979,351	1,201,054,119	1,190,480,901
Vermilion	13,539,526	12,382,725	12,126,490	14,483,285
Cuyuna	52,124,561	51,090,529	49,652,592	53,268,438
Gogebic	51,646,890	52,131,121	53,342,720	48,681,075
Marquette	68,978,647	67,160,777	63,612,812	60,219,781
Menominee	67,184,024	69,188,118	67,103,492	64,752,677
Total	1,503,559,995	1,485,932,621	1,446,892,225	1,431,886,157

Source: U. S. Bureau of Mines.

PRODUCTION OF IRON ORE

The following graph made up from figures published by the Lake Carriers Association, Lake Superior Iron Ore Association, and the Bureau of Mines, shows the total production of iron ore in the United States from 1874 to 1928 compared with the total yearly shipments of iron ore from the Lake Superior district for the same period. An


SHIPMENTS OF IRON ORE
FROM LAKE SUPERIOR RANGES
COMPARED WITH
TOTAL PRODUCTION
IN THE UNITED STATES
1874–1928
MILLIONS OF TONS
YEARS
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
1874
1880
1885
1890
1895
1900
1905
1910
1915
1920
1925
1928
UNITED STATES
RANGES
RANGE
LAKE SUPERIOR
RANGES
TOTAL LAKE
TOTAL ALL
OTHER
MESABI

103996—30——17

examination of the chart and tables Nos. 140 and 141 will show the importance the Lake Superior ore region has attained in the iron and steel industry since the opening of the Marquette Range in 1855. The production curve of the ore mined in the United States has been governed since 1903 by the production of the Mesabi Range, rising and falling according to the fluctuation of this range.

The chart shows that since 1902 there has been a rather even fluctuation in production, but generally tending to rise abruptly to a slightly higher level after a precipitous drop. The years 1916 and 1917 were years of peak production, over 75,000,000 tons being produced in each year. The tremendous drop in 1921 brought production down to the lowest level reached since 1904. This may be attributed to the postwar decline of general business activity which was of short duration, however. In 1922 there was an increase in production nearly as marked as the precipitous drop in 1921. Since 1922, however, production has averaged a little over 60,000,000 tons annually.

TABLE No. 140.—*Yearly shipments of iron ore from Lake Superior ranges compared with total production of United States* [1]

[Quantities in long tons]

Year	Marquette	Menominee	Gogebic	Vermilion	Mesabi	Cuyuna	Total lake ranges	Total production, United States
1855	1,449						1,449	
1856	36,343						36,343	
1857	25,646						25,646	
1858	15,876						15,876	
1859	68,832						68,832	
1860	114,401						114,401	
1861	49,909						49,909	
1862	124,629						124,629	
1863	203,055						203,055	
1864	243,127						243,127	
1865	236,208						236,208	
1866	278,796						278,796	
1867	475,567						475,567	
1868	491,449						491,449	
1869	617,444						617,444	
1870	830,940						830,940	
1871	779,607						779,607	
1872	900,901						900,901	
1873	1,162,458						1,162,458	
1874	919,557						919,557	
1875	891,257						891,257	
1876	992,764						992,764	
1877	1,010,494	4,593					1,015,087	
1878	1,033,082	78,028					1,111,110	
1879	1,130,019	245,672					1,375,691	
1880	1,384,010	524,735					1,908,745	7,120,362
1881	1,579,834	727,171					2,307,005	7,119,643
1882	1,829,394	1,136,018					2,965,412	8,700,000
1883	1,305,425	1,047,415					2,352,840	8,800,000
1884	1,548,034	895,634	1,022	62,124			2,506,814	7,718,129
1885	1,480,422	690,435	119,860	225,484			2,516,201	7,600,000
1886	1,627,383	880,006	747,589	305,396			3,559,374	10,000,000
1887	1,851,414	1,193,343	1,303,267	394,252			4,742,276	11,300,000
1888	1,918,750	1,191,101	1,424,699	511,953			5,046,503	12,062,530
1889	2,634,816	1,796,755	2,016,391	844,682			7,292,644	14,518,041
1890	2,993,664	2,282,237	2,847,786	880,014			9,003,701	16,036,043

[1] Source: 1909–1928, inclusive, L. S. I. O. A. and Bureau Mines; 1855–1908, inclusive (L. C. A.; U. S. Geol. Survey).

TABLE No. 140.—*Yearly shipments of iron ore from Lake Superior ranges compared with total production of United States*—Continued

[Quantities in long tons]

Year	Marquette	Menominee	Gogebic	Vermilion	Mesabi	Cuyuna	Total lake ranges	Total production, United States
1891	2,512,242	1,824,619	1,839,574	894,618			7,071,053	14,591,178
1892	2,666,856	2,261,499	2,973,076	1,167,650	4,245		9,073,326	16,296,666
1893	1,835,893	1,466,197	1,329,385	820,621	613,620		6,065,716	11,587,629
1894	2,060,260	1,137,949	1,809,468	948,513	1,793,052		7,749,242	11,879,679
1895	2,097,838	1,923,798	2,547,976	1,077,838	2,781,587		10,429,037	15,957,614
1896	2,604,221	1,560,467	1,799,971	1,088,099	2,882,079		9,934,828	16,005,449
1897	2,715,035	1,937,013	2,258,236	1,278,481	4,275,809		12,464,574	17,518,046
1898	3,125,039	2,522,265	2,498,461	1,265,142	4,613,766		14,024,673	19,433,716
1899	3,757,010	3,301,052	2,795,856	1,771,502	6,626,384		18,251,804	24,683,173
1900	3,457,522	3,261,221	2,875,295	1,655,820	7,809,535		19,059,393	27,553,161
1901	3,245,346	3,619,053	2,938,155	1,786,063	9,004,890		20,593,507	28,887,479
1902	3,868,025	4,612,509	3,654,929	2,084,263	13,342,840		27,562,566	35,554,135
1903	3,040,245	3,749,567	2,912,708	1,676,699	12,892,542		24,271,761	35,019,308
1904	2,843,703	3,074,848	2,398,287	1,282,513	12,156,008		21,755,359	27,644,330
1905	4,215,572	4,495,451	3,705,207	1,677,186	20,158,699		34,252,115	42,526,133
1906	4,057,187	5,109,088	3,643,514	1,792,355	23,819,029		38,421,173	47,749,728
1907	4,388,073	4,964,728	3,637,907	1,685,267	27,495,708		42,171,683	51,720,619
1908	2,414,632	2,679,156	2,699,856	841,544	17,257,350		25,892,538	35,983,336
1909	4,252,622	4,875,385	4,088,210	1,108,775	28,178,101		42,503,093	51,294,271
1910	4,392,726	4,237,758	4,316,070	1,203,306	29,200,406		43,350,266	57,014,906
1911	2,835,902	3,911,174	2,603,319	1,089,441	22,099,037	147,649	32,686,522	43,876,552
1912	4,202,723	4,711,479	5,006,438	1,845,246	32,045,301	305,135	48,116,322	55,150,147
1913	3,967,918	4,967,354	4,531,679	1,566,797	34,040,384	732,781	49,806,913	61,980,437
1914	2,491,857	3,222,070	3,568,703	1,017,606	21,467,626	867,728	32,634,990	41,439,761
1915	4,106,202	4,983,192	5,477,767	1,733,631	29,756,891	1,128,131	47,185,814	55,526,490
1916	5,409,582	6,364,518	8,489,783	1,947,365	42,526,025	1,716,227	66,453,500	75,167,672
1917	4,874,150	6,045,750	7,979,898	1,530,810	41,440,595	2,422,477	64,293,680	75,288,851
1918	4,354,297	6,379,363	7,936,838	1,192,933	40,397,014	2,478,923	62,739,368	69,658,278
1919	2,992,245	4,446,528	6,229,565	929,164	32,003,502	1,859,200	48,460,204	60,965,418
1920	4,608,323	6,569,413	8,763,332	1,007,465	37,147,963	2,191,528	60,288,024	67,604,465
1921	1,116,560	1,584,466	2,336,500	869,354	16,349,935	489,500	22,746,315	29,490,978
1922	2,818,374	4,079,444	6,220,985	1,211,559	28,064,247	1,496,356	43,890,965	47,128,527
1923	3,891,801	4,855,370	6,579,730	1,278,684	41,806,230	2,220,733	60,632,548	69,351,442
1924	3,174,835	3,836,826	5,159,990	978,163	29,142,247	1,469,054	43,761,115	54,267,419
1925	4,197,846	5,629,633	7,068,478	1,437,741	35,890,174	1,514,053	55,737,925	61,907,997
1926	4,435,029	5,946,377	7,537,078	1,586,030	38,250,856	2,082,689	59,838,059	67,623,000
1927	4,147,777	5,213,256	6,385,558	1,547,847	32,975,506	1,981,501	52,251,445	61,741,100
1928	4,298,717	4,841,637	6,540,019	1,671,466	35,398,660	2,097,716	54,848,215	62,197,088

Table 141, compiled from figures published by the American Iron and Steel Institute, shows the total production of iron ore by districts and the percentage of the Lake Superior region to the total United States production. In 1890 the Lake Superior region produced 55.77 per cent of the total and since that time it has steadily gained in the percentage of ore produced. The highest percentage reached was 85.94 in 1919. A slight decline may be noticed from this high mark in later years, but it has still maintained an average of approximately 84 per cent.

TABLE NO. 141.—*Production of iron ore by districts, 1890–1928*

[Quantities in long tons]

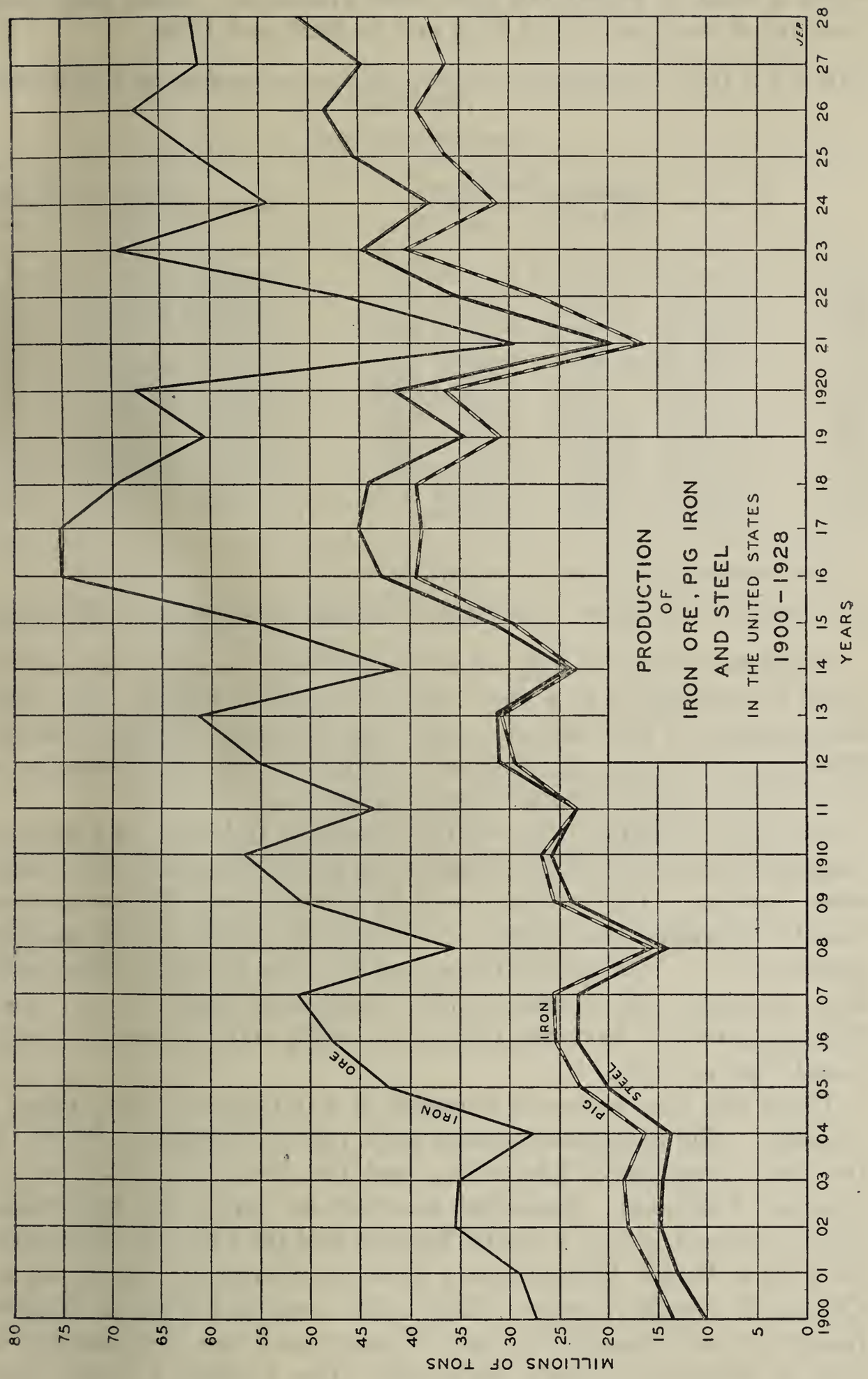
	Total production	Lake Superior		Birmingham, Chattanooga [1]	Adirondack [1]	Northern New Jersey, southeastern New York	Other districts
		Production	Per cent of total				
1890	16,036,043	8,994,031	55.77	----	----	----	7,092,012
1891	14,591,178	7,621,465	52.23	----	----	----	6,969,713
1892	16,296,666	9,564,388	58.69	----	----	----	6,732,278
1893	11,587,629	6,594,620	56.91	----	----	----	4,993,009
1894	11,879,679	7,682,548	64.67	----	----	----	4,197,131
1895	15,957,614	10,268,978	64.35	----	----	----	5,688,636
1896	16,005,449	10,566,359	66.02	----	----	----	5,439,090
1897	17,518,046	12,205,522	69.67	----	----	----	5,312,524
1898	19,433,716	13,779,308	70.90	----	----	----	5,654,408
1899	24,683,173	17,802,955	72.13	----	----	----	6,880,218
1900	27,553,161	20,564,238	74.63	----	----	----	6,988,923
1901	28,887,479	21,445,903	74.24	----	----	----	7,441,576
1902	35,554,135	26,977,404	75.88	----	----	----	8,576,731
1903	35,019,308	26,573,271	75.88	----	----	----	8,446,037
1904	27,644,330	20,198,311	73.06	----	----	----	7,446,019
1905	42,526,133	33,325,018	78.36	----	----	----	9,201,115
1906	47,749,728	37,876,371	79.32	----	----	----	9,873,357
1907	51,720,619	41,526,579	80.29	----	----	----	10,194,040
1908	35,983,336	28,108,079	78.11	----	----	----	7,875,257
1909	51,294,271	41,863,635	81.61	4,417,571	869,185	634,069	3,509,811
1910	57,014,906	46,328,743	81.26	5,015,674	1,146,080	598,601	3,925,808
1911	43,876,552	35,550,225	81.02	4,058,037	885,827	589,508	2,792,955
1912	55,150,147	46,368,878	84.08	4,736,263	965,736	509,282	2,569,988
1913	61,980,437	52,377,362	84.51	5,311,192	1,214,704	451,453	2,625,726
1914	41,439,761	33,540,403	80.94	4,714,562	544,724	541,084	2,098,988
1915	55,526,490	46,944,254	84.54	5,287,953	699,213	644,493	1,950,577
1916	75,167,672	63,735,088	84.79	6,812,641	1,077,638	683,150	2,859,155
1917	75,288,851	63,481,321	84.32	7,008,558	1,100,001	642,232	3,056,739
1918	69,658,278	59,779,794	85.82	5,932,916	762,029	523,862	2,659,677
1919	60,965,418	52,392,339	85.94	5,077,970	740,315	491,458	2,263,336
1920	67,604,465	57,860,530	85.59	5,801,131	783,590	546,365	2,612,849
1921	29,490,978	25,298,485	85.78	2,893,368	446,619	79,513	772,993
1922	47,128,527	39,716,016	84.27	5,083,604	406,342	113,629	1,808,936
1923	69,351,442	59,285,408	85.49	6,680,958	460,311	376,495	2,548,270
1924	54,267,419	44,841,719	82.63	7,059,009	197,437	110,626	2,058,628
1925	61,907,997	52,056,663	84.09	6,992,526	----	328,745	2,530,063
1926	67,623,000	57,143,407	84.50	6,775,341	----	[2] 847,966	2,856,286
1927	61,741,100	51,539,880	83.48	6,455,061	----	[2] 1,073,819	2,672,340
1928	62,197,088	52,517,175	84.44	6,359,700	----	[2] 963,089	2,357,124

[1] Not available in reports of the Geological Survey prior to 1909.
[2] Includes small quantities of iron ore from "other districts."

Source: American Iron and Steel Institute (U. S. Bureau of Mines.)

In connection with the study of production statistics, the following graph and supporting Table No. 142 compiled from figures of the American Iron and Steel Institute showing the production of iron ore, pig iron, and steel in the United States from 1900 to 1928, inclusive, may prove interesting. It will be noted that the production of these products has maintained a steady increase since 1900 and that the production of steel ingots and castings has increased much more rapidly than that of pig iron and ferro alloys. Steel production trailed that of pig iron in 1900 by 2,600,000 tons, passed it in 1911, and in 1928 exceeded it by 13,300,000 tons. This increase in the production of steel over pig iron may be attributed to newer methods of utilizing scrap iron and steel with pig iron in producing new steel.

The peak in steel production was reached in 1928 when 51,544,180 tons were manufactured. Other high points reached were 48,000,000 tons in 1926 and 45,000,000 in each of the years 1925 and 1917.


PRODUCTION
OF
IRON ORE, PIG IRON
AND STEEL
IN THE UNITED STATES
1900 – 1928
ORE
IRON
PIG
IRON
STEEL
MILLIONS OF TONS
YEARS
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
1900 01 02 03 04 05 06 07 08 09 1910 11 12 13 14 15 16 17 18 19 1920 21 22 23 24 25 26 27 28

The greatest amount of pig iron made in any one year was in 1923, when a total of 40,361,146 tons were produced. Other peak years occurred during the World War and in 1926 and 1928.

TABLE NO. 142.—*Production of iron ore, pig iron and steel in the United States, 1900–1928*

[Quantities in long tons]

	Iron ore	Pig iron and ferro alloys	Steel ingots and castings		Iron ore	Pig iron and ferro alloys	Steel ingots and castings
1900	27,553,161	13,789,242	10,188,329	1915	55,526,490	29,916,213	32,151,036
1901	28,887,479	15,878,354	13,473,595	1916	75,167,672	39,434,797	42,773,680
1902	35,554,135	17,821,307	14,947,250	1917	75,288,851	38,621,216	45,060,607
1903	35,019,308	18,009,252	14,534,978	1918	69,658,278	39,054,644	44,462,432
1904	27,644,330	16,497,033	13,859,887	1919	60,965,418	31,015,364	34,671,232
1905	42,526,133	22,992,380	20,023,947	1920	67,604,465	36,925,987	42,132,934
1906	47,749,728	25,307,191	23,398,136	1921	29,490,978	16,688,126	19,783,797
1907	51,720,619	25,781,361	23,362,594	1922	47,128,527	27,219,904	35,602,926
1908	35,983,336	15,936,018	14,023,247	1923	69,351,442	40,361,146	44,943,696
1909	51,294,271	25,795,471	23,955,021	1924	54,267,419	31,405,790	37,931,939
1910	57,014,906	27,303,567	26,094,919	1925	61,907,997	36,700,566	45,393,524
1911	43,876,552	23,649,547	23,676,106	1926	67,623,000	39,372,729	48,293,763
1912	55,150,147	29,726,937	31,251,303	1927	61,741,100	36,565,645	44,935,185
1913	61,980,437	30,966,152	31,300,874	1928	62,197,088	38,155,714	51,544,180
1914	41,439,761	23,332,244	23,513,030				

Source: American Iron and Steel Institute Report, 1928.

MOVEMENT OF IRON ORE FROM MINES TO UPPER LAKE PORTS

In the movement of iron ore from the mine to smelter, the railroad must be considered as a very important link or factor. The rapid development of the various ranges has depended largely upon the development of adequate railroad facilities for the transportation of the ore from mine to port and port to smelter.

In order to handle the ore economically and with the greatest despatch the railroads have developed a special type of carrier, which when run upon the ore dock will fit exactly over the ore pockets thereby allowing the filling of designated pockets with specified grades of ore. The ore from the time it is dug from the mine hardly stops moving until it reaches the smelters or stock piles at lower lake ports so well have the mines, railroads, and ore carriers coordinated their services.

There are nine railroads engaged in handling ore from mine to shipside. The Marquette Range ships ore to Marquette, Mich., by the Lake Superior & Ishpeming, and the Duluth, South Shore & Atlantic Railroads. Escanaba receives ore from the Menominee Range via the Chicago & North Western and the Chicago, Milwaukee, St. Paul & Pacific Railroads and from the Marquette Range via the Chicago & North Western. Ashland is connected with the Gogebic Range by the Chicago & North Western and the Minneapolis, St. Paul & Sault Ste. Marie Railroads. The Duluth & Iron Range Railroad carries ore from the Vermilion and Mesabi Ranges to Two Harbors. Duluth receives ore from the Mesabi Range via the

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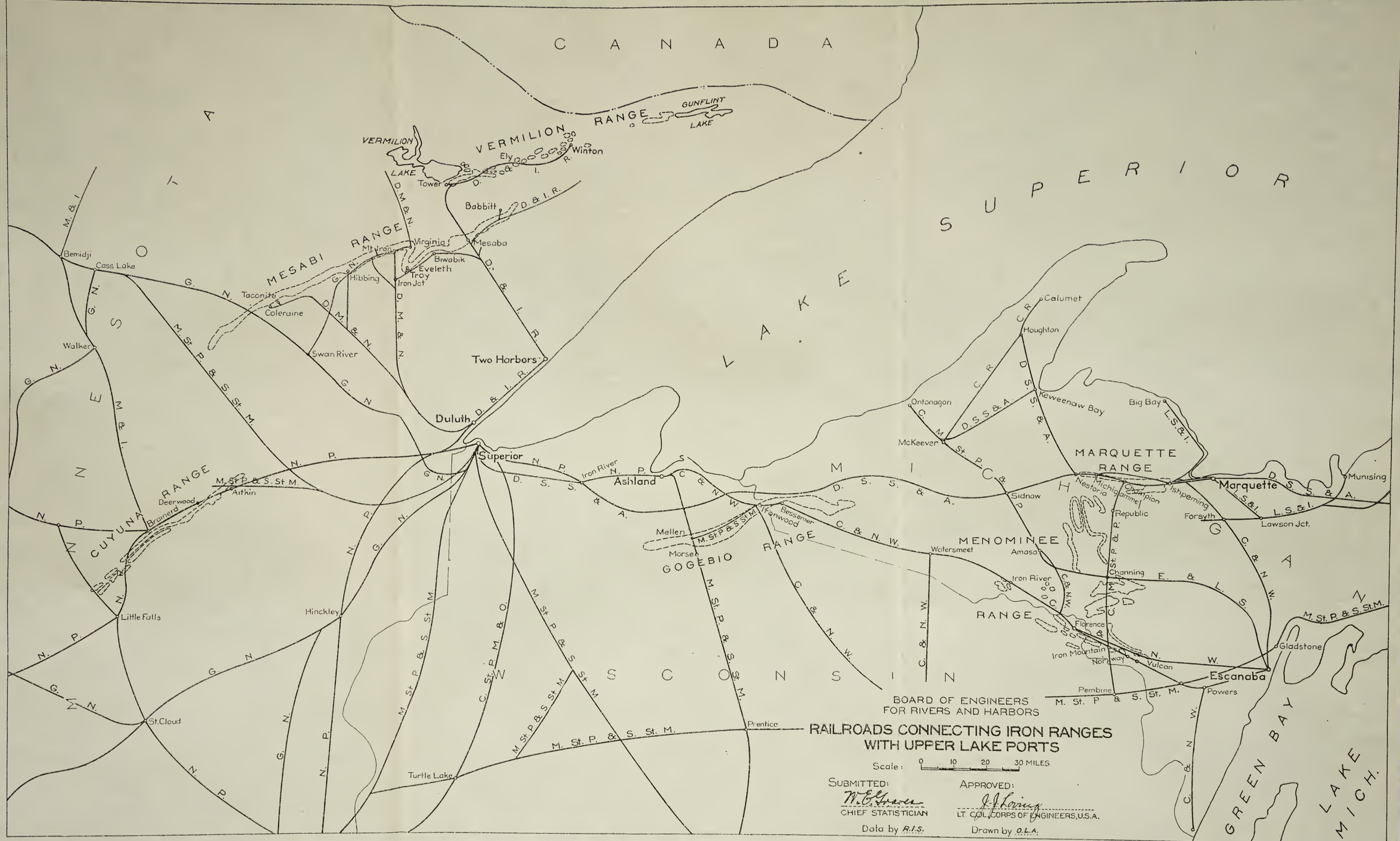


BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

RAILROADS CONNECTING IRON RANGES WITH UPPER LAKE PORTS

Scale: 0 10 20 30 MILES

SUBMITTED:
W. E. Graves
CHIEF STATISTICIAN

APPROVED:
J. J. Loring
LT. COL. CORPS OF ENGINEERS, U.S.A.

Data by R.I.S.

Drawn by O.L.A.

103996—30. (Face p. 251.)

Duluth, Missabe & Northern Railroad. Superior is the terminal point for ore from the Mesabi Range via the Great Northern and from the Cuyuna Range via the Northern Pacific and the Minneapolis, St. Paul & Sault Ste. Marie Railroads. The map shows the territory served by each of these roads in the Lake Superior region.

All railroads have special equipment for the carrying of ore and all operate their own docks at the respective ports which they serve. Table No. 143 shows the special ore-carrying equipment of the railroads serving the Lake Superior district.

TABLE NO. 143.—*Ore-carrying equipment of railroads in Lake Superior district as of December, 1928*

Railroad	Capacity of cars in pounds	Inside dimensions						Number of cars
		Length		Width		Height		
		Feet	Inches	Feet	Inches	Feet	Inches	
Great Northern Ry. Co	100,000	20	5	7	9½	5	7	70
	100,000	20	3¾	7	10	5	8	3,109
	100,000	24	0	9	0	7	9	92
	100,000	30	0¼	8	8½	9	11	9
	100,000	22	3	9	1	7	7	286
	150,000	19	10	9	9⅝	------	------	1,500
	150,000	19	7	9	11	7	0	997
	150,000	20	5	10	2½	------	------	750
	100,000	25	1	9	6¼	8	8	3
	100,000	24	2	9	5	7	9	94
	100,000	19	10	7	10	6	3	[1] 2
	100,000	34	4½	8	10½	6	5½	376
	100,000	19	8½	7	10	5	6	1,420
	80,000	35	0½	8	9½	7	5¼	[1] 4
Total								8,712
Duluth & Iron Range	100,000	20	4	7	11	5	6	377
	100,000	20	4	8	0	5	0	1,036
	100,000	17	1	8	6	6	0	1,691
	100,000	18	6	8	6	6	0	1,300
	100,000	18	7	8	6	6	0	450
Total								4,854
Chicago, Milwaukee, St. Paul & Pac.R. R. Co.	110,000	18	11¼	7	11½	7	3	167
	110,000	18	11¼	7	11½	7	3	261
	110,000	18	11¼	7	11½	7	3	318
	110,000	18	11¼	7	11½	7	3	245
	110,000	18	11¼	7	11½	------	------	657
Total								1,648
Duluth South Shore & Atlantic Ry	60,000	26	0	7	3½	6	7	98
	80,000	22	0	8	0½	6	7	298
	100,000	20	4	8	1¼	7	0	399
	100,000	20	4	7	11½	7	2½	124
	100,000	18	8	8	6	------	------	150
Total								1,069
Chicago & North Western Ry	100,000	19	4	8	1⅞	6	6	17
	100,000	19	4	8	5⅞	6	6	486
	100,000	19	4	8	1⅞	6	6	3,424
	80,000	18	6	8	0	5	6	[1] 1
	100,000	19	4	7	9⅞	6	6	492
	100,000	19	4	8	1½	6	8 15/16	1,300
	140,000	21	1¾	8	11½	7	0⅛	400
Total								6,120

[1] Wood.

TABLE No. 143.—*Ore-carrying equipment of railroads in Lake Superior district as of December, 1928*—Continued

Railroad	Capacity of cars in pounds	Inside dimensions						Number of cars
		Length		Width		Height		
		Feet	Inches	Feet	Inches	Feet	Inches	
Lake Superior & Ishpeming	60,000	22	0	8	6	------	-------	134
	100,000	22	0	8	11	------	-------	500
	80,000	21	5	8	0	------	-------	40
	80,000	21	3	8	4	------	-------	49
	100,000	21	10	8	6	------	-------	247
	100,000	21	10	8	0	------	-------	199
	100,000	20	4	8	0	------	-------	210
	100,000	17	8	8	6	------	-------	90
Total								1,469
Minneapolis, St. Paul & S. S. Marie Ry. Co	50,000	17	2¼	6	10½	4	11⅝	14
	50,000	17	2¼	6	10½	4	4⅝	9
	100,000	17	4¼	9	0	7	9	1,521
	100,000	18	4	8	6	7	10	185
	100,000	18	10	8	6	8	6	304
	150,000	19	8⅝	10	1½	8	6⅞	250
Total								2,283
Northern Pacific Ry. Co	150,000	19	11	10	3½	8	5½	200
	100,000	18	1¾	8	6½	7	10	791
Total								991
Duluth, Missabe & Northern Ry. Co	100,000	20	4	8	0	4	3	638
	100,000	20	4	8	0	4	2	3,595
	100,000	18	1	8	7	4	6	148
	100,000	18	1¾	8	7	4	5	999
	100,000	18	6	8	6	4	6	306
	100,000	17	5	8	10	5	11	2,001
	190,000	19	5	10	2	6	6	25
	190,000	21	1	10	3	6	5	25
	162,000	19	8	10	3	8	3	250
Total								7,987

METHODS EMPLOYED IN TRANSPORTING ORE FROM RANGES TO PORTS

The transportation of the ore from mines to docks would be a comparatively simple operation if the grades of ore from various ranges, mines, and even shafts were similar, but the wide divergence in the chemical constituents of the ores makes sampling and mixing a necessary operation in order to bring the ore up to a certain grade. It seldom occurs that a train carries ore of such analysis that it may be run straight through from loading point to the docks without being split up for mixing. This, coupled with the fact that the ore vessels must be loaded promptly with a fixed tonnage and that the cargo loaded must be within a small fraction of 1 per cent of the analysis on which it was sold, does not allow much flexibility in the rail transportation of the ore.

As a result of this situation a well-defined plan of operation has been evolved. At the mine the cars, if loaded direct from the shaft or pit or from the stock pile, are taken to the mine siding, where a sample is taken from every 10 cars. These samples, together with

the numbers of the cars, are sent to the laboratory when the cars are made into a train and are started for their destination. The samples are analyzed and the results are entered on a "train sheet." The office then has the necessary data for each train which is ordinarily made up of 50 to 150 cars.

Daily reports of the vessels due within the ensuing 24 hours showing their tonnage capacity and the grades of the ore which they will load are received at the office. As the ore arrives it is laid out in the dock and numbered, a series of "ore blocks" containing a certain tonnage of ore of a specific analysis. A record of each block with its position in the docks is kept, so that blocks cannot be split up or altered. These blocks are prepared in such a manner that they will fill the requirements of the incoming vessel as to tonnage and grade of ore. Besides being segregated into Bessemer and non-Bessemer, the ores are divided according to the percentage of iron, silica, and manganese contents. Thus, if a certain grade of ore is desired, two or more blocks of different analyses may be mixed to bring the ore up or down to the required level. In order that this may be done with the least possible delay, there are kept on hand blocks of ore of varying grades to raise or lower the analysis of incoming blocks. Consequently, a vessel taking ore must load an entire block, as the mixing is a mathematical rather than a physical process.

A chart and supporting table have been compiled from data furnished by the Lake Superior Iron Ore Association to show the flow of iron ore from ranges and individual mines to the ports of shipment via carrying railroads. The lines on the chart follow as closely as is feasible the route of the carrying railroads from range to port. A map showing the railroads serving the iron ore region will be found on page 251.

TABLE No. 144.—*Movement of iron ore from ranges to ports, 1928*

[Quantities in long tons]

Carrying railroad	To—						
	Duluth	Superior	Two Harbors	Ashland	Marquette	Escanaba	Total
From Mesabi Range:							
Great Northern		13, 375, 488					13, 375, 488
Duluth, Missabe & Northern	17, 454, 064						17, 454, 064
Duluth & Iron Range			4, 162, 285				4, 162, 285
Total							34, 991, 837
Vermilion Range: Duluth & Iron Range			1, 571, 360				1, 571, 360
Cuyuna Range:							
Chicago, Milwaukee, Ste. St. Marie		1, 145, 348					1, 145, 348
Northern Pacific		896, 377					896, 377
Total							2, 041, 725

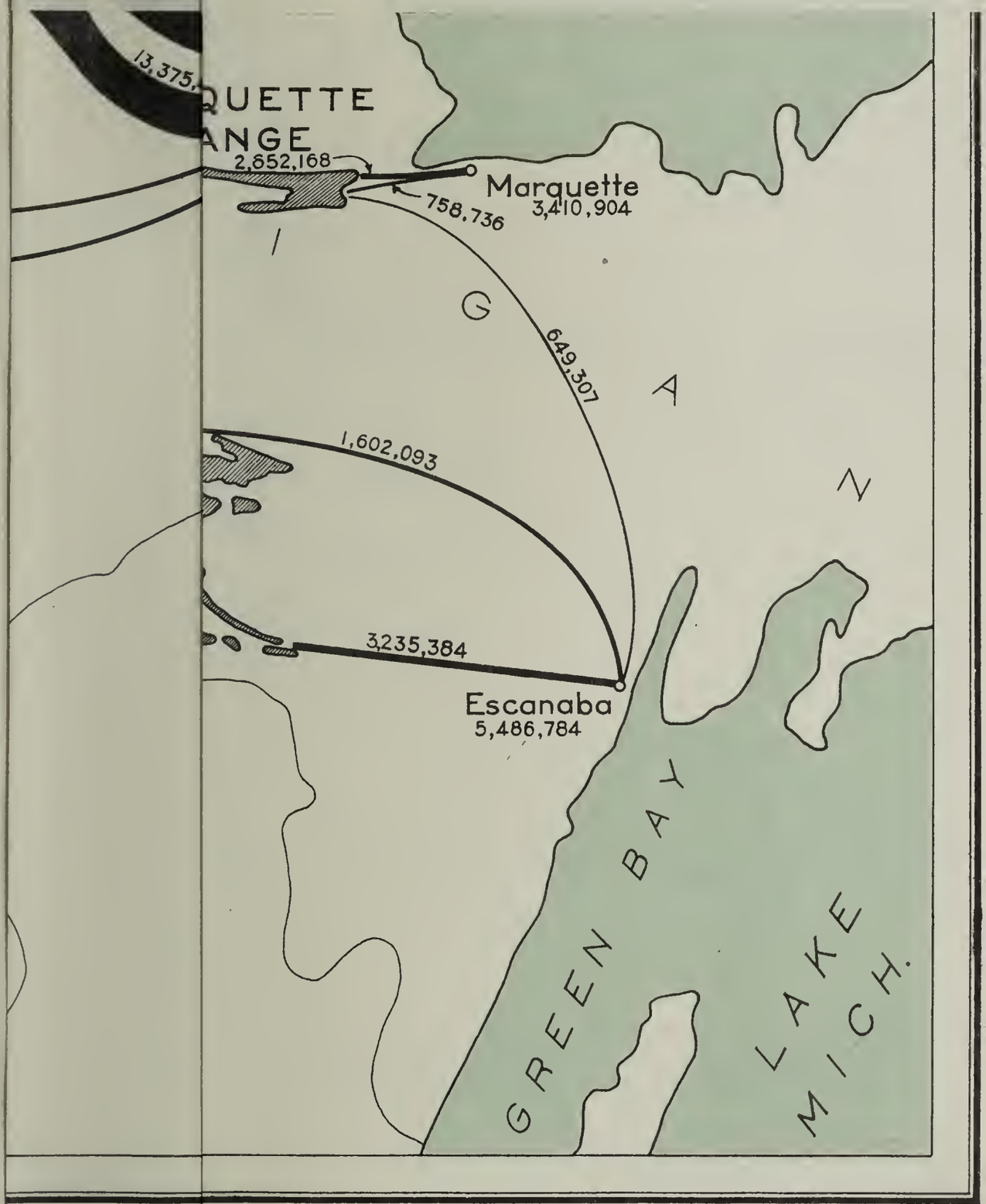
TABLE No. 144.—*Movement of iron ore from ranges to ports, 1928*—Continued

Carrying railroad	To—						
	Duluth	Superior	Two Harbors	Ashland	Marquette	Escanaba	Total
Gogebic Range:							
Chicago & Northwestern				4, 574, 273			4, 574, 273
Chicago, Milwaukee, Ste. St. Marie				1, 904, 505			1, 904, 505
Total							6, 478, 778
Marquette Range:							
Chicago & Northwestern						649, 307	649, 307
Lake Superior & Ishpeming					2, 652, 168		2, 652, 168
Duluth, South Shore & Atlantic					758, 736		758, 736
Total							4, 060, 211
Menominee Range:							
Chicago & Northwestern						3, 235, 384	3, 235, 384
Chicago, Milwaukee & St. Paul						1, 602, 093	1, 602, 093
Total							4, 837, 477
Total shipments to	17, 454, 064	15, 417, 213	5, 733, 645	6, 478, 778	3, 410, 904	5, 486, 784	53, 981, 388

Referring to Table No. 144, it is interesting to note that the Mesabi Range shipped 34,991,837 tons, or 64.8 per cent of the total movement, from ranges to ports. Duluth received 17,454,064 tons, or 50 per cent of the ore moved from this range, while Superior received 13,375,488 tons, or 38 per cent, and Two Harbors received 4,162,285 tons, or 12 per cent. The Vermilion Range contributed 1,571,360 tons, or 2.9 per cent of the total, all of which moved to the port of Two Harbors. The Cuyuna Range supplied 2,041,725 tons, or 3.8 per cent of the total movement. The port of Superior received the entire amount.

The movement from the Gogebic Range amounted to 6,478,778 tons, or 12 per cent of the total, all of which went to the port of Ashland. The ports of Marquette and Escanaba received, respectively, 3,410,904 tons and 649,307 tons from the Marquette Range, which totals 4,060,211 tons, or 7.5 per cent of the total ore movement. The Menominee Range moved 4,837,477 tons, or 9 per cent of the total, to the port of Escanaba.

Duluth led all ports in the tonnage of ore received with 17,454,064 long tons, but Superior was a close competitor with 15,417,213 tons. Ashland ranked third with a tonnage of 6,478,778, while Two Harbors and Escanaba received 5,733,645 and 5,486,784 tons, respectively. Marquette received the lowest tonnage, which was 3,410,904 long tons.



WILLIAMS & HEINTZ CO., WASH., D. C.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.ARMY.

C A N A D A

VERMILION RANGE

GUNFLINT LAKE

VERMILION LAKE

1,571,360

MESABI RANGE

5,735,645

Two Harbors
5,732,742

983

17,454,064

Duplicate

Duluth
17,454,064

13,375,488

Superior
13,418,116

1,145,348

CUYUNA RANGE

896,377

Ashland
6,478,778

4,574,273

1,904,505

GOGEBIC RANGE

MARQUETTE RANGE

2,652,168

Marquette
3,410,904

758,736

649,307

MENOMINEE

1,602,093

RANGE

3,235,384

Escanaba
5,486,784

M I C H I G A N

L A K E S U P E R I O R

M I N N E S O T A

W I S C O N S I N

GREEN BAY

LAKE MICH.

Scale of Miles
0 10 20 30 40 50

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF IRON ORE FROM RANGES TO UPPER LAKE PORTS, 1928

(Quantities in long tons)

Scale: 0 20 40 M. Tons

SUBMITTED
W. E. Gravea
CHIEF STATISTICIAN

APPROVED:
J. J. Loring
LT. COL. CORPS OF ENGINEERS, U.S.A

Data by G.M.R.

Drawn by J.E.P.

WILLIAMS & HEINTZ CO. WASH. D. C.

TABLE NO. 145.—*Shipments of Lake Superior iron ore from mines during the year 1928*

[Quantities in long tons]

MESABI RANGE

Mine	Great Northern	To upper lake ports for shipment by water		All rail direct	Total
		D. M. & N.	D. & I. R.		
Aad			23,712	1	23,713
Adams-Spruce group			1,701,953	79,010	1,780,963
Albany		204,716			204,716
Alexandria	317,430				317,430
Areturus		501,324			501,324
Bennett	499,415				499,415
Biwabik			329,847		329,847
Bruce	210,924				210,924
Burt-Pool-Day		836,437			836,437
Chisholm		110,455		66,663	177,118
Corsica			399,384		399,384
Danube	312,707				312,707
Dunean		5,352			5,352
Dunwoody	700,029			318	700,347
Fayal			651,650		651,650
Frantz	32,432				32,432
Frazer		701,640			701,640
Godfrey		119,594			119,594
Harold	297,850				297,850
Harrison	463,530				463,530
Hawkins	606,160			24	606,184
Helmer		35,368			35,368
Higgins & McEwen		112,735			112,735
Hill Annex	906,505			51	906,556
Hill Trumbull	488,897				488,897
Hoadley (Crosby)	101,881				101,881
Hull Rust		1,892,588		6	1,892,594
Kerr		259,424			259,424
Kevin	61,923				61,923
Kinney	105,977				105,977
Lamberton	87,468				87,468
La Rue	433,889				433,889
Laura	169,775				169,775
Leetonia	97,901				97,901
Leonidas			972,543	132,307	1,104,850
Lincoln		328,201		7	328,208
Maee No. 2	37,338				37,338
Mahoning	2,832,355			82	2,832,437
Mary Ellen	67,467		[1] 903	37,438	105,808
Missabe Mountain		5,255,947		24	5,255,971
Mississippi	201,388				201,388
Moose		14,477			14,477
Morris	154,663	1,277,707			1,432,370
Morrison		790,144			790,144
Morrow Extension			12,347		12,347
North Harrison	331,256				331,256
Patriek	291,939				291,939
Quinn	131,548				131,548
Ruddy	15,202				15,202
St. Paul	497,527				497,527
Sargent	291,606				291,606
Sauntry		529,333			529,333
Scranton	391,023			13,694	404,717
Seetion 13-58-19		8,799			8,799
Sellers		2,441,002			2,441,002
Shaw		124,937			124,937
Shenango		774,809		40	774,849
Siphon			61,111		61,111
South Agnew	328,422				328,422
South Tener (Trespass)		1,276			1,276
South Uno. G. N	198,120				198,120
Susquehanna	505,094				505,094
Tyler (Lamberton Annex)	48,551				41,558
Union			8,835		8,835
Utica	254,382			43,148	297,530
Wabigon	599,351			42	599,393
Wacootah	129,164	351,708		43	480,915
Wade	73,410	225,021			298,431
Wanless		160,583			160,583
Webb		33,121			33,121
Wellington		357,366		33,925	391,291
York	100,989				100,989
Total	13,375,488	17,454,064	4,162,285	[2] 406,823	35,398,660

[1] Transferred 678 to Soo Line and 225 to Northern Paeific. [2] Ineludes 771 tons ore lost in transit.

TABLE No. 145.—*Shipments of Lake Superior iron ore from mines during the year 1928*—Continued

GOGEBIC RANGE

Mine	To upper lake ports for shipment by water		All rail direct	Total
	C. & N. W.	Soo line		
Anvil	2,747	106		2,853
Cary	220,411		1,329	221,740
Davis	428			428
Eureka-Asteroid	553,083		17	553,100
Geneva	17,323			17,323
Ironton	304,398	349,213	66	653,677
Keweenaw	75,815	43,653		119,468
Massie	23,509	16,462		39,971
Montreal		1,162,620	4,194	1,166,814
Newport	595,904			593,904
Norrie Aurora	835,580	217,887		1,053,467
Palms	95,416	68,570		163,986
Plymouth	556,401			556,401
Puritan	255,706			255,706
Sunday Lake	369,603		435	370,038
Tilden		32,798		32,798
Townsite		13,196		13,196
Wakefield	571,562		55,200	626,762
West Davis	98,387			98,387
Total	4,574,273	1,904,505	[1] 61,241	6,540,019

[1] Includes 185 tons ore lost in transit.

MARQUETTE RANGE

Mine	C. & N. W.	To upper lake ports for shipment by water		All rail direct	Total
		L. S. & I.	D.S.S.&A.		
Archibald		264,159			264,159
Athens	7,284	312,916			320,200
Austin		9,483			9,483
Cambria			139,898		139,898
Cliffs Shaft	35,860	316,680		35,927	388,734
Empire	16,458	45,730	31,792	1,785	95,765
Francis		23,603			23,603
Gardner	64,674	6,001			70,675
Holmes		177,080		4,207	181,287
Imperial	69,372		3,914		73,286
Isabella	70,750		60,598		131,348
Lake Superior	214,345	1,123			215,468
Lucky Star (Trespass)		40			40
Maas		328,025			328,025
Maitland	24,046		23,530		47,576
Mary Charlotte		165,572			165,572
Morris Lloyd	8,686	288,422		96,076	393,184
Negaunee	3,900	372,253		96,580	472,733
Ogden	29,230	86,368		817	116,415
Princeton	2,411			1,453	3,864
Republic		45,517		1,649	47,166
Richmond (New)			153,556		153,556
Rolling Mill	1,258	36,083			37,341
Stephenson	35,802	172,933			208,735
Volunteer	65,144		345,448	12	410,604
Total	649,307	2,652,168	758,736	[1] 238,506	4,298,717

[1] Includes 12 tons ore lost in transit.

TABLE NO. 145.—*Shipments of Lake Superior iron ore from mines during the year 1928*—Continued

MENOMINEE RANGE

Mine	To upper lake ports for shipment by water		All rail direct	Total
	C. & N. W.	C. M. & St. P.		
Aragon	250,487			250,487
Balkan	76,904			76,904
Baltic	1,425			1,425
Bates	89,374	62,018	12	151,404
Bengal	230,290		1,584	231,874
Berkshire	253,329		18	253,347
Bristol	163,403	169,639	50	333,092
Buck	45,443			45,443
Carpenter	21,053	55,094		76,147
Caspian	247,039		63	247,102
Chapin	113,096	355,979	15	469,090
Davidson	150,008	101,274		251,282
Fogarty	43,869			43,869
Forbes		151,956	225	152,181
Genesee	699			699
Hiawatha	101,889	68,978	195	171,062
Homer	195,747			195,747
James		233,004	48	233,052
Judson	151,449			151,449
Loretto	149,241			149,241
Newman (Youngs)	8,120			8,120
Odgers		42,499		42,499
Penn Mines	395,898			395,898
Riverton	239,822			239,822
Rogers	3,055	176,734	138	179,927
Tobin	48,644	18,305		66,949
Virgil	22,334			22,334
Warner		154,591	1,812	156,403
Wauseca	75,543			75,543
West Chapin		12,022		12,022
Zimmerman	157,223			157,223
Total	3,235,384	1,602,093	[1] 4,160	4,841,637

[1] Includes 821 tons ore lost in transit.

CUYUNA RANGE

Mine	To upper lake ports for shipment by water		All rail direct	Total
	Soo Line	Northern Pacific		
Armour No. 1	239,068	8,488		247,556
Armour No. 2	159,136		1,397	160,533
Croft		181,623		181,623
Evergreen	114,722	41,939	2,227	158,888
Feigh		9,243		9,243
Hillcrest	43,616	23,843		67,459
Ironton	11,983		44,392	56,375
Louise	106,558	112,463	395	219,416
Mahnomen	169,206	171,424		340,630
Mangan	8,785	2,872		11,657
Maroco	46,379	113,393	169	159,941
Merritt	2,942			2,942
Milford	154,020		7,411	161,431
Sagamore	80,868	229,100		309,968
Wearne	8,065	1,989		10,054
Total	1,145,348	896,377	[1] 55,991	2,097,716

[1] Includes 424 tons ore lost in transit.

TABLE NO. 145.—*Shipments of Lake Superior iron ore from mines during the year 1928*—Continued

VERMILION RANGE

Mine	D. & I. R. (to upper lake ports for shipment by water)	All rail direct	Total
Chandler		47,168	47,168
Pioneer	671,258	87	671,345
Sibley	431,189	24	431,213
Soudan	157,373	7,588	164,961
Zenith	311,540	45,239	356,779
Total	1,571,360	[1] 100,106	1,671,466

[1] Includes 139 tons ore lost in transit.

SUMMARY

Mine	To upper lake ports for shipment by water,	All rail direct	Total
Mesabi	34,991,837	406,823	35,398,660
Gogebic	6,478,778	61,241	6,540,019
Menominee	4,837,477	4,160	4,841,637
Marquette	4,060,211	238,506	4,298,717
Cuyuna	2,041,725	55,991	2,097,716
Vermilion	1,571,360	100,106	1,671,466
Mayville		7,426	7,426
Total United States mines	[1] 53,981,388	[2] 874,253	54,855,641

[1] Includes 9,004 tons ore left in dock.

[2] Includes 2,352 tons ore lost in transit.

ALL-RAIL MOVEMENT OF IRON ORE DURING 1928

In addition to the movement of iron ore to upper lake ports for shipment via lake there was an all-rail movement direct from the ranges to consuming points. During 1928 this movement amounted to 874,253 tons. Duluth received a total tonnage of 600,000 tons or 68.6 per cent of the total all-rail movement, 400,000 tons of which originated in the Mesabi Range, 100,000 in the Vermilion, 60,000 in in the Cuyuna, and 40,000 in the Gogebic Ranges. Marquette and Mancelona received a total of 70,000 and 30,000 tons, respectively, from the Marquette and Menominee Ranges. There were also distributed from these ranges to miscellaneous points a total of 4,000 tons. St. Louis and Newbury each received 60,000 tons of ore from the Gogebic and Marquette Ranges, and the latter shipped 40,000 tons to Wells, 2,000 tons to Cadillac, and 1,000 tons to East Jordan. The Mayville Range, while not regularly included as a Lake Superior ore shipping range, moved its entire output of 7,000 tons by rail to Mayville.

The total all-rail movements from each range were as follows: Vermilion, 100,000 tons; Mesabi, 407,000; Cuyuna, 56,000; Gogebic, 61,000; Menominee, 4,000; Marquette, 239,000; and Mayville, 7,000 tons.

ORE-LOADING TERMINALS

The first ore-shipping docks [1] on the Great Lakes were built at L'Anse, Marquette, and Escanaba, Mich., in the early seventies. The one at L'Anse was erected in 1872 by the Marquette, Houghton, Ontonagon Railroad. This was 546 feet long, 36 feet wide, and 38 feet high. It was built of wood and at that time was considered the last word in ore dock construction. It had 80 "vessel pockets" and 40 "steamboat pockets." Ore was unloaded from these docks by gravity, the ore running through spouts at the bottom of the pockets to vessel below. The spouts on the vessel pockets were 20 feet above and those in the steamboat pockets but 12 feet above the water. Ore from the latter was directed into hand carts, which were wheeled on board steamboats.

From this structure there has been developed the modern concrete and steel "dock." Because of the short life of the wooden structures and the increase in the cost of timber, concrete and steel construction has taken the place of wood. The first dock of steel and concrete was built at Two Harbors in 1908.

The ore storage and loading facilities at the six upper Lake ports are owned and operated by the several railroads carrying ore into these ports. At Escanaba, the Chicago, Milwaukee, St. Paul & Pacific and the Chicago & North Western Railroads each own and operate two docks, while in Ashland the latter road operates three. In addition, the Soo Line operates one at Ashland, making a total of four for that port. Ore shipped out through Marquette passes over two docks, one owned by the Duluth, South Shore & Atlantic Railroad and the other by the Lake Superior & Ishpeming Railroad. Superior has six, four of which are owned by the Great Northern Railway, one by the Northern Pacific, and one by the Soo Line. The Duluth, Missabe & Northern Railway operates two at Duluth, and the Duluth & Iron Range Railroad operates three at Two Harbors.

The docks range from 900 to 2,304 feet in length and from 66 feet 6 inches to 84 feet in height, from water to the deck above the bins. The number of pockets vary from 148 to 384, depending upon the length of the dock. All discharge ore into vessels by means of gravity by opening a trap at the bottom of the pockets and allowing the ore to pour out through spouts into vessels holds. A good example of the modern ore dock is No. 6, owned by the Duluth, Missabe & Northern Railway, at Duluth. It is of steel and concrete construction, 2,304 feet long, and contains four tracks with the necessary trestle approach, upon which are two tracks. It is 84 feet high and the width between the outside faces of the pockets is 60 feet. The extreme

[1] It should be noted that the terminology "dock" is generally in vogue on the Great Lakes when referring to ore loading and unloading facilities. Discussion of these terminals will be found elsewhere in this report.

width of the operating platform is 75 feet 5 inches. It has 384 pockets arranged in pairs, one on either side of the longitudinal ridge running along the center. The floors of the pockets have a slope of 47½° from the horizontal, the depth being 5 feet 11 inches on the inside and about 39 feet on the outside, or front of the pockets. The pockets are 12 feet wide, center to center, and each has a capacity of 6,560 cubic feet.

The frame is of structural steel, and consists of bents located in the partition between pockets. The structural steel serves only as the frame. All pocket floors, partitions, corner fillers, and the track deck are reinforced concrete slabs cast in place, openings being left between the rails for dumping cars. Between the pockets there is a crosswalk, 2 feet wide, connecting the longitudinal walls of the deck. The frames of the pockets are entirely of steel. Ladders are provided at intervals of 144 feet and give access to a continuous platform at the level of the outlet doors. The operation is by electricity throughout. The hatches of lake boats are usually spaced 12 and 24 feet center to center, which is also the spacing of the pockets and the chutes. Thus it is possible to load ore into all hatches of a boat simultaneously.

The following tables contain detailed descriptions of all ore docks at upper lake ports:

TABLE No. 146.—*Ore-loading terminals at upper lake ports*

Owner and operator	Chicago & North Western Railway					Chicago, Milwaukee, St. Paul & Pacific Railroad	
Number	No. 1	No. 2	No. 3	No. 5	No. 6	No. 1	No. 2.
Location	Ashland, Wis	Ashland, Wis	Ashland, Wis	North Escanaba, Mich.	North Escanaba, Mich.	North Escanaba, Mich	North Escanaba, Mich.
Type of construction	Timber	Timber	Timber	Timber	Timber	Timber	Timber.
Dimensions (feet):							
Length	1,740	1,668	2,040	2,220	1,920	1,500	1,500.
Width	49–6	49–6	51–6	51–6	51–6	52	54.
Depth of water (feet)	21–26	21–26	21–26	22	22	24	24.
Berthing capacity (feet)	3,480	4,336	4,080	4,440	3,840	3,000	3,000.
Ore pockets:							
Number	290	278	340	370	320	240	240.
Capacity in cubic feet	4,100	3,550	4,260	4,142	4,260	2,900	3,150.
Capacity each (tons)	250	200	250	250	250	175	200.
Total storage capacity (tons)	72,500	55,600	85,000	92,500	80,000	32,000	38,000.
How operated	Gravity, spouts electrically.	Gravity, spouts, electrically.	Gravity, spouts electrically.	Gravity, spouts by hand.	Gravity, spouts by hand.	Gravity, spouts by hand.	Gravity, spouts by hand.
Tracks on docks:							
Number	4	4	4	4	4	4	4.
Car capacity	290	278	340	360	320	240	240.
Supporting yards:							
Number	1	1	1	2	2	1	1.
Distance from dock	⅜ mile	See No. 1 dock	See No. 1 dock	½ mile and 2½ miles.	See No. 5 dock	2 miles	See No. 1 dock.
Car capacity	375			650 and 900		820	

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TABLE No. 146.—*Ore-loading terminals at upper lake ports*—Continued

Owner and operator	Duluth & Iron Range Railroad		
Number	No. 1	No. 2	No 6.
Location	Two Harbors, Minn	Two Harbors, Minn	Two Harbors, Minn.
Type of construction	Steel and concrete	Steel and concrete	Steel and concrete.
Dimensions (feet):			
Length	1,376	1,400	920.
Width	51-8	56-8	51′ ¾″
Depth of water (feet)	22	22	22.
Berthing capacity (feet)	2,752	2,800	1,840.
Ore pockets:			
Number	224	228	148.
Capacity in cubic feet	4,532	5,360	4,820.
Capacity each (tons)	250	300	300.
Total storage capacity (tons)	56,000	68,400	44,400.
How operated	Gravity, spouts electrically	Gravity, spouts electrically	Gravity, spouts electrically.
Tracks on docks:			
Number	4	4	4.
Car capacity	224	228	148.
Supporting yards:			
Number	1	Same as No. 1 dock	Same as No. 1 dock.
Distance from dock	½ mile		
Car capacity	1,400 loaded, 700 empty		

Owner and operator	Minneapolis, St. Paul & Sault Ste. Marie Railway	Northern Pacific Ry.	Lake Superior & Ishpeming R. R.	Duluth, South Shore & Atlantic Railway
Number	No. 2	No. 1	No. 2	No. 5.
Location	Ashland, Wis	Superior, Wis	Marquette, Mich	Marquette, Mich.
Type of construction	Timber and concrete	Steel and concrete	Steel and concrete	Timber.
Dimensions (feet):				
Length	1,800	1,860	1,200	1,236.
Width	59	59-2	54	51.
Depth of water (feet)	20-24	22-25	21-24	22-24.
Berthing capacity (feet)	3,600	3,720	2,400	2,472.
Ore pockets:				
Number	300	310	200	200.
Capacity in cubic feet	5,100	5,600	4,590	3,848.
Capacity each (tons)	350	350	250	225.
Total storage capacity	105,000 tons	108,500 tons	50,000 tons	45,000 tons.
How operated	Gravity, spouts electrically	Gravity, spouts electrically	Gravity, spouts electrically	Gravity, spouts electrially.
Tracks on docks:				
Number	4	4	4	4.
Car capacity	300	350	200	200.

Supporting yards:				
Number	1	1	1	1.
Distance from dock	1¼ miles	1 mile, at Hill Avenue	⅜ mile	¾ mile.
Car capacity	800	600	1,000	700.
Remarks		The Soo Line ships ore over this dock also.		

Owner and operator	Duluth, Missabe & Northern Railway		Great Northern Railway			
Number	No. 5	No. 6	No. 1	No. 2	No. 3	No 4.
Location	West Duluth, Minn.	West Duluth, Minn.	Superior, Wis	Superior, Wis	Superior, Wis.	Superior, Wis.
Type of construction	Timber piles, steel and concrete superstructure.	Timber piles, steel and concrete superstructure.	Steel and concrete	Steel and concrete	Steel and concrete	Steel and concrete.
Dimensions (feet):						
Length	2,304	2,304	2,244	2,100	1,956	1,812.
Width	56	60	56	56	59-8	62-6.
Depth of water (feet)	22-27	22-27	21-26	21-26	21-26	21-26.
Berthing capacity (feet)	4,608	4,608	4,488	4,200	3,912	3,624.
Ore pockets:						
Number	384	384	374	350	326	302.
Capacity in cubic feet	5,313	6,560	5,620	5,620	5,100	5,035.
Capacity each (tons)	300	400	350	350	300	300.
Total storage capacity (tons)	115,200	153,600	130,900	122,500	97,800	90,600.
How operated	Gravity, spouts electrically.	Gravity, spouts electrically.	Gravity, spouts electrically.	Gravity, spouts electrically.	Gravity, spouts electrically.	Gravity, spouts electrically.
Tracks on docks:						
Number	4	4	4	4	4	4.
Car capacity	384	384	374	374	326	326.
Supporting yards:						
Number	1	1	1	1	1	1.
Distance from dock	At Proctor, about 8 miles.	See No. 5 dock	¼ to ½ mile			
Car capacity	2,800 loaded, 1,500 empty.		1,500 classification, 2,500 receiving.	See No. 1 dock	See No. 1 dock	See No. 1 dock.

MOVEMENT OF IRON ORE FROM UPPER LAKE PORTS TO LOWER LAKE PORTS DURING 1928

During the years 1927 and 1928 the iron-ore movement from upper lake ports to lower lake ports covered a period of approximately seven months, beginning the latter part of April and ending the latter part of November. In previous years the movement did not end until the early part of December, as the Lakes remained comparatively free from ice, the determining factor in the seasonal movement of all commodities via the Great Lakes. A total movement of 53,980,874 tons of ore during 1928 marked the fourth consecutive year that shipments of ore exceeded 50,000,000 gross tons, the greatest amount shipped during this period of record movements being 58,537,855 tons in 1926. However, this figure is about 6,000,000 tons less than the record shipment of 64,734,198 gross tons made in 1916. The large shipments made during the years 1916 to 1918, inclusive, were the results of the abnormal demands of the war, but the large movements from 1923 to 1928, inclusive, were made for normal peace-time requirements and are the more notable for that reason.

Table No. 147 shows the movement of ore by months for the 9-year period 1920 to 1928, inclusive. The month of August is generally regarded as the month of peak shipments although the months of June, July, and September also show comparatively heavy movements.

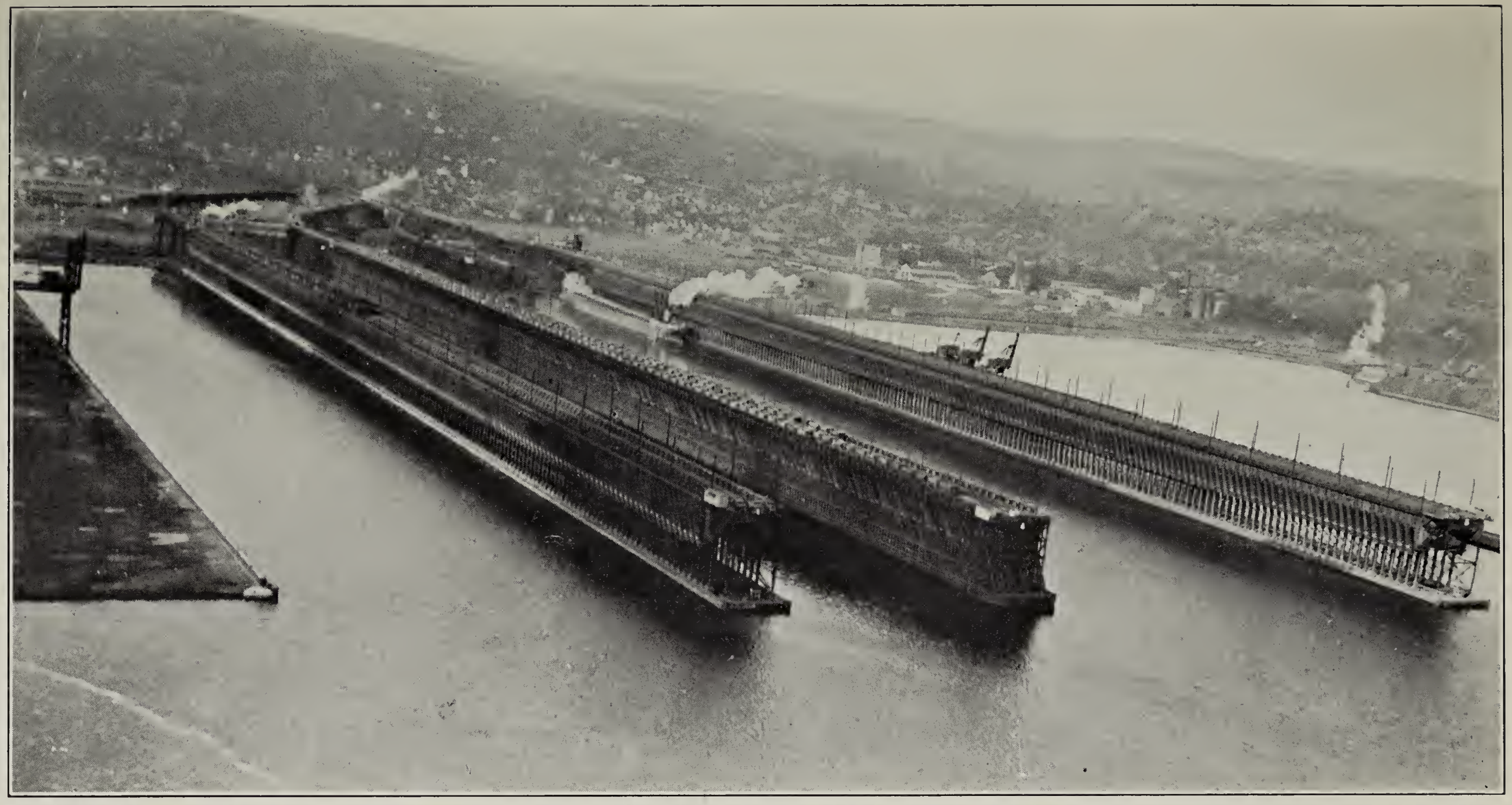
TABLE NO. 147.—*Comparative movement of iron ore by months for the years 1920–1928, inclusive*

[Quantities in long tons]

Month	1928	1927	1926	1925	1924	1923	1922	1921	1920
April	5,946	1,560,086	9,664	2,120,715	659,387	14,184	136,161	176,211	230,854
May	5,362,963	7,752,471	6,113,584	8,313,984	6,583,815	6,671,705	1,585,305	2,594,027	6,976,085
June	8,926,216	8,458,866	8,770,551	7,958,486	7,583,926	9,499,501	6,629,756	3,600,989	9,233,566
July	8,979,699	8,607,000	10,006,093	8,531,250	7,280,014	10,411,248	8,942,336	4,047,687	9,638,606
August	9,242,869	8,775,493	10,709,260	8,532,718	6,689,799	10,296,133	9,016,426	4,329,158	9,270,763
September	8,748,286	7,230,041	9,621,756	7,354,873	6,164,936	9,095,982	6,801,299	3,913,122	8,923,482
October	8,453,952	6,722,757	9,337,774	7,004,443	5,596,648	8,099,716	6,081,386	3,233,081	8,848,986
November	4,260,942	2,000,422	3,946,662	4,257,612	2,056,141	4,938,249	3,410,934	406,451	5,305,738
December	----------	----------	22,511	7,217	8,906	9,894	9,626	----------	99,146
Total	53,980,874	51,107,136	58,537,855	54,081,298	42,623,572	59,036,705	42,613,229	22,300,726	58,527,226

Source: Lake Carriers' Association report.

Table No. 148 shows the shipment of ore from Lake Superior ports and Escanaba for the period 1914 to 1928, inclusive. These statistics show that the port of Duluth, Minn., still maintains the lead in the shipments of iron ore over the port of Superior, Wis. During the season 1928 these two ports shipped 17,454,063 and 15,413,694 long tons, respectively, constituting 60 per cent of the total ore movement for the year. The next largest shipment of 6,481,158 tons was made from Ashland, which was followed by Two Harbors, Escanaba, and Marquette, respectively.



DULUTH, MISSABE & NORTHERN RAILWAY ORE DOCKS NOS. 5, 4, AND 6, DULUTH-SUPERIOR HARBOR (COAL DOCK IN FOREGROUND)

ORE LOADING DOCKS OF THE GREAT NORTHERN RAILWAY, DULUTH-SUPERIOR HARBOR

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TABLE NO. 148.—*Shipments of iron ore from upper lake ports, 1914–1928, inclusive*

[Quantities in long tons]

Port	1914	1915	1916	1917	1918
Escanaba	3,664,451	5,649,289	7,457,444	7,156,854	6,774,969
Marquette	1,775,726	3,099,589	3,858,092	3,207,145	3,457,054
Ashland	3,363,419	5,146,772	8,057,814	7,597,841	7,565,608
Superior	11,309,748	8,342,793	12,787,046	13,978,741	14,068,341
Duluth	6,318,291	15,437,419	21,837,949	20,567,419	20,567,288
Two Harbors	5,610,262	8,642,942	10,735,853	9,990,901	8,723,472
Total	32,021,897	46,318,804	64,734,198	62,498,901	61,156,732

Port	1919	1920	1921	1922	1923
Escanaba	4,963,358	7,361,070	1,806,656	4,592,354	5,607,411
Marquette	2,132,935	3,415,108	786,946	1,976,220	2,789,285
Ashland	5,915,383	8,180,852	2,264,705	5,813,207	6,237,449
Superior	10,919,965	14,812,398	4,991,278	11,234,240	17,820,477
Duluth	16,821,209	15,479,334	9,164,803	13,044,771	20,163,619
Two Harbors	6,424,545	9,278,464	3,286,338	5,952,437	6,418,464
Total	47,177,395	58,527,226	22,300,726	42,613,229	59,036,705

Port	1924	1925	1926	1927	1928
Escanaba	4,244,669	5,644,278	6,599,597	5,865,224	5,487,556
Marquette	2,516,548	3,487,968	3,417,462	3,238,855	3,410,902
Ashland	4,807,565	6,664,501	7,139,865	6,239,774	6,481,158
Superior	4,817,494	14,560,477	16,476,264	14,627,936	15,413,694
Duluth	13,355,214	17,707,978	18,638,395	15,432,188	17,454,063
Two Harbors	12,882,082	6,016,096	6,266,272	5,703,159	5,733,501
Total	42,623,572	54,081,298	58,537,855	51,107,136	53,980,874

Source: Lake Superior Iron Ore Association.

The accompanying flow chart, made up from data in Tables Nos. 148–149, furnished by the Lake Superior Iron Ore Association, shows the actual flow of iron ore from port to port. Referring back to Table No. 148 it will be seen that shipments from the upper lake ports during 1928 totalled 53,980,874 tons, and on a further examination of Table No. 149 it will be seen that the total receipts at lower lake ports were 53,441,057 tons making a difference of 539,817 tons or 1 per cent. This difference may be attributed to losses in weight through handling and methods of determining weights at upper and lower lake ports. Table No. 150 gives a comparative statement of iron ore receipts at Lake Erie and other lake ports for the years 1909 to 1928, inclusive.

From the ports of Duluth, Superior, Two Harbors, Ashland, and Marquette there was an outward movement of iron ore which reached its greatest volume at the eastern end of Lake Superior as the flow was entering the locks of the Sault Ste. Marie Canal. From this point the volume of the flow began to decline. Sault Ste. Marie withdrawing 609,005 tons and 12,751,443 tons being diverted to ports at the head of Lake Michigan. This flow of ore from Lake Superior ports into Lake Michigan was augmented by 1,652,238 tons shipped from Escanaba, making a total of 14,403,681 tons delivered

to Lake Michigan ports. Calumet received 7,089,813 tons; Indiana Harbor, 2,380,814 tons; and Gary, 4,789,018 tons. East Jordan immediately across the lake from Escanaba received 9,699 tons from Escanaba, which is not included in the above figures on the Lake Michigan movement. In addition to the shipments to Lake Michigan ports from Escanaba, 3,742,017 tons moved from Escanaba and joined the flow passing through Lake Huron and 82,669 tons were delivered at Sault Ste. Marie. Following the stream passing through Lake Huron and into Lake Erie, we find the following ports diverting ore for local consumption and shipment to interior points: Point Edward received 519,417 tons; Detroit, 1,004,295 tons: Toledo, 1,503,338 tons; Huron, 1,010,927 tons; Lorain, 3,423,111 tons; Cleveland, 9,375,755 tons; Fairport, 1,839,171 tons; Ashtabula, 6,376,050 tons; Conneaut, 8,437,401 tons; Erie, 653,233 tons; Port Colborne, 165,494 tons, and Buffalo, inclusive of Tonawanda, 4,171,787 tons.

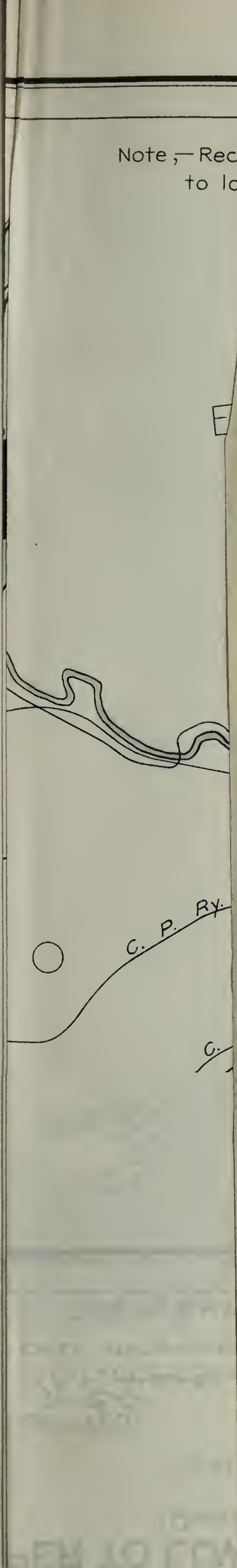
TABLE NO. 149.—*Movement of ore from port to port, 1928*

[Quantities in long tons]

Receiving ports	Shipping ports						
	Duluth	Superior	Two Harbors	Ashland	Marquette	Escanaba	Total
Buffalo [1]	49,811	2,187,115	135,144	533,835	302,083	1,129,293	4,337,281
Erie		413,044	9,282	80,909	74,599	75,399	653,233
Conneaut	5,330,110	530,798	1,752,007	704,968	18,612	100,906	8,437,401
Ashtabula	470,061	3,381,215	479,368	844,114	702,573	498,719	6,376,050
Fairport	1,039,608	275,805	393,612	106,237	23,909		1,839,171
Cleveland	1,862,617	3,348,221	462,714	1,609,486	1,123,897	968,820	9,375,755
Lorain	1,721,270	407,887	790,656	288,366	121,034	93,898	3,423,111
Huron	200,572	287,391	125,058	252,760	145,146		1,010,927
Toledo	55,527	469,024	29,992	347,420	249,730	351,645	1,503,338
Detroit		255,652		213,317	255,387	279,939	1,004,295
Indiana Harbor		1,530,238	18,641	722,683	6,147	103,105	2,380,814
Gary	3,383,591	218,131	678,796			508,500	4,789,018
South Chicago	3,166,366	1,598,760	774,743	525,833		1,024,111	7,089,813
East Jordan						9,699	9,699
Soo		221,317		60,143	327,545	82,669	691,674
Point Edward		134,927	26,157	126,265	26,145	205,983	519,477
Total	17,279,533	15,259,525	5,676,170	6,416,336	3,376,807	5,432,686	53,441,057

[1] Buffalo includes Port Colborne and North Tonawanda.

Source: Lake Superior Iron Ore Association.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WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.ARMY

Note;—Receipts are about 1% less than shipments due to loss in transit and method of weighing.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF IRON ORE FROM UPPER TO LOWER LAKE PORTS, 1928

(Quantities in long tons)

Scale: 0 10 30 50 Mil. Tons

SUBMITTED:
W. C. Gray
CHIEF STATISTICIAN

APPROVED:
C. J. Tilden
LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by G.M.R.

Drawn by O.L.A. & E.L.G.

WILLIAMS & HEINTZ CO. WASH. D.C.

TABLE NO. 150

RECEIPTS OF IRON ORE AT OTHER THAN LAKE ERIE PORTS[1]

[Quantities in long tons]

Year	Detroit	Indiana Harbor	Gary	South Chicago	Milwaukee	Boyne City	East Jordan	Elk Rapids	Fruitport	Sault Ste. Marie	Point Edward	Other Canadian ports[2]	Total
1909	176,754	179,426	1,928,522	4,411,541	214,834	33,250	18,654	41,222	43,075	284,086	265,903	75,994	7,673,261
1910	343,729	322,340	1,790,545	5,066,613	137,531	48,516	37,913	59,705	36,493	281,727	307,737	91,319	8,524,168
1911	244,698	365,312	1,302,745	3,416,857	110,242	28,016	36,215	21,788	----------	305,019	283,693	76,528	6,191,113
1912	469,772	514,748	2,088,327	5,480,105	138,065	32,888	42,587	47,947	----------	544,869	320,794	276,501	9,956,603
1913	392,049	455,252	2,365,940	5,572,845	234,591	26,081	28,546	----------	----------	537,514	247,008	45,763	9,905,589
1914	332,564	661,054	1,631,564	3,467,344	93,121	60,742	37,958	17,793	----------	310,511	161,092	7,917	6,781,660
1915	459,877	689,226	2,421,924	4,195,976	187,286	36,491	39,157	----------	----------	500,931	226,923	19,799	8,777,590
1916	425,579	793,215	2,718,185	7,740,877	239,219	43,788	38,573	----------	----------	585,318	356,119	41,157	12,982,030
1917	418,151	900,692	3,883,082	7,030,174	224,570	44,437	35,792	----------	----------	653,096	328,774	11,400	13,530,168
1918	444,936	1,413,392	3,829,150	6,094,164	165,903	34,137	33,940	----------	----------	711,068	251,575	90,482	13,068,747
1919	549,096	1,150,683	2,509,338	4,670,054	133,220	47,084	32,706	----------	----------	550,539	350,757	4,998	9,998,475
1920	813,381	1,264,114	3,656,719	6,261,027	128,367	30,053	14,452	----------	----------	725,123	331,879	18,265	13,243,380
1921	269,488	779,478	2,350,580	2,655,114	20,552	----------	10,892	----------	----------	293,151	174,191	----------	6,553,446
1922	803,482	1,145,596	2,894,447	5,000,941	27,040	3,695	17,873	----------	----------	291,456	296,267	----------	10,480,797
1923	902,548	1,639,271	3,982,161	6,991,845	123,807	2,001	34,624	----------	----------	617,217	470,938	----------	14,764,412
1924	844,479	1,552,388	3,093,427	4,524,118	----------	----------	32,166	----------	----------	360,216	231,334	----------	10,638,128
1925	944,524	1,879,013	4,889,039	6,442,034	71,724	----------	9,217	----------	----------	227,532	375,424	----------	14,838,507
1926	904,514	2,560,106	4,861,201	6,376,290	58,509	----------	32,435	----------	----------	363,837	502,478	----------	[3] 15,662,399
1927	1,037,199	2,117,613	4,066,864	5,895,671	----------	----------	32,486	----------	----------	457,065	435,909	----------	14,042,807
1928	1,004,295	2,380,811	4,789,017	7,089,856	----------	----------	9,699	----------	----------	691,674	519,453	----------	16,484,805

[1] B/L weights.
[2] Does not include Port Colborne (see Buffalo).
[3] Includes 3,029 tons ore received at Duluth from Superior by barge.

Source: Lake Superior Iron Ore Association.

TABLE No. 150—Continued

RECEIPTS OF IRON ORE AT LAKE ERIE PORTS[1]

[Quantities in long tons]

Year	Toledo	Sandusky	Huron	Lorain	Cleveland	Fairport	Ashtabula	Conneaut	Erie	Buffalo[2]	Total
1909	1,374,224	11,088	243,082	2,796,856	6,051,342	1,734,277	8,056,941	7,007,834	1,235,057	5,002,235	33,512,936
1910	1,225,202	----------	197,951	2,884,738	6,344,943	1,516,434	9,620,638	6,309,548	942,592	4,704,439	33,746,485
1911	493,568	----------	223,947	2,936,604	4,587,949	666,365	6,359,128	6,931,278	283,427	2,802,552	25,284,818
1912	1,466,920	----------	540,586	3,771,392	7,915,055	1,810,381	8,158,080	7,839,831	547,067	5,065,163	37,114,475
1913	1,083,260	----------	687,484	3,717,429	8,818,211	2,037,126	8,336,126	7,849,303	713,902	5,520,095	38,762,936
1914	774,452	----------	617,363	1,681,767	5,511,492	1,558,134	5,318,788	6,263,480	260,991	3,099,771	25,086,238
1915	1,164,074	----------	695,865	3,524,700	7,504,728	2,001,103	7,813,101	8,573,509	707,875	5,536,116	37,521,071
1916	2,035,160	----------	1,324,112	4,613,929	10,669,745	2,580,647	11,474,268	9,588,341	1,525,031	7,570,460	51,381,693
1917	2,445,602	----------	1,631,395	3,831,244	9,077,161	2,311,179	10,251,304	8,729,754	2,079,227	8,037,842	48,394,708
1918	2,577,407	----------	1,620,712	3,494,370	9,681,864	1,853,465	11,001,574	6,650,898	1,809,619	9,017,062	47,706,971
1919	1,536,436	----------	1,134,104	3,379,463	7,466,731	1,952,635	8,377,254	7,056,882	1,102,478	4,868,333	36,874,316
1920	2,654,957	----------	1,421,509	4,030,571	7,857,163	1,247,964	11,028,518	5,989,763	2,218,658	8,384,153	44,833,256
1921	411,241	----------	553,806	1,788,175	2,559,390	1,340,017	2,001,806	5,329,396	386,627	1,183,883	15,554,341
1922	1,227,351	----------	654,575	2,780,123	7,185,827	1,032,797	7,740,105	6,550,681	666,288	3,872,176	31,709,923
1923	1,516,490	----------	1,105,902	3,497,905	8,977,251	2,224,441	10,499,368	8,949,478	1,381,122	5,514,114	43,666,071
1924	1,107,393	----------	737,431	3,063,240	6,638,721	1,875,105	6,550,388	7,411,314	571,755	3,620,756	31,576,103
1925	1,432,546	----------	1,009,495	4,116,222	8,766,020	2,116,442	7,799,184	8,635,835	652,392	4,173,675	38,701,811
1926	1,560,240	----------	1,191,353	3,787,021	9,615,812	2,136,800	9,194,065	9,514,669	1,044,086	4,243,017	42,287,063
1927	1,304,864	----------	1,175,294	3,520,023	8,295,971	1,902,168	7,154,052	8,129,859	1,146,479	3,924,081	36,552,791
1928	1,503,387	----------	1,010,927	3,423,111	9,375,764	1,839,171	6,376,035	8,437,401	653,233	4,337,313	36,956,342

[1] B/L weights.
[2] Includes receipts at North Tonawanda and Port Colborne.

Source: Lake Superior Iron Ore Association.

ORE UNLOADING FACILITIES AT LOWER LAKE PORTS

Methods of unloading ore at lower lake ports have undergone rapid improvements. From the earlier block and fall rig, hoisting half-ton buckets loaded by hand shovels, there have been evolved the modern ore unloaders with buckets, ranging in capacity from 5 to 17½ tons. Those of the larger type are capable of discharging a 10,000-ton vessel in three or four hours.

The vessels, as they enter, tie up along the face of the wharf on which are mounted the unloading machines operating on tracks. These are usually operated in batteries of from four to six machines. Vessels and machines are so designed as to enable an entire battery to operate on one vessel at the same time.

While the operation of unloading is in process the ore is sampled in the holds of the vessel in order to determine its "test." As the ore is removed from the ship it is weighed and carried to railroad cars running under the unloading machines for direct shipment to interior points or to stock piles to the rear of the dock for future consumption. Some of the machines are designed to act as unloaders, distributors, and loaders, while others are used for unloading to railroad cars or stock pile only. The latter type require bridge cranes in conjunction with them to distribute the ore uniformly over the stock piles and to load cars from them.

The shippers have arranged their schedules so that a steady flow of iron ore passes from the receiving ports to interior consuming points. As far as possible the ore is shipped direct from shipside in order to save the extra expense of handling from ship to storage pile and from storage pile to railroad cars. However, receiving terminals usually have large stock piles at the end of the lake shipping season, from which the interior furnaces draw their supply, so as to keep production at an even tenor with consequent less hardship to their employees.

The facilities available for the unloading, stocking, and reshipping of iron ore at lower lake ports are shown in Table No. 151.

TABLE NO. 151.—*Ore-unloading terminals*

Location	Calumet Harbor, Ill.	Calumet River, Ill.	One hundred and twenty-second Street and Calumet River	Calumet Harbor, Ill.; South Chicago, Ill.	One hundred and ninth Street and Calumet River, Calumet Harbor, Ill.	East Chicago, Ind.	Gary Harbor, Ind.
Name or number	Illinois Steel Co	Federal Furnace Plant.	General Chemical Co.	Iroquois Works, South Chicago Works.	International Harvester Co., Wisconsin Steel Works.	Indiana Harbor Works.	Indiana Steel Co.
Owner	do	By Products Coke Corp.	do	The Youngstown Sheet & Tube Co.	do	The Youngstown Sheet & Tube Co.	Do.
Type of construction	Concrete cap on piles.	Concrete and wood.	Pile	Concrete dock	Concrete dock	Concrete dock	Concrete cap on piles.
Dimensions (feet):							
Length	North Slip, 2,728; South Slip, 1,223.	700 concrete, 98 wood, 18.6 face of dock to center of pier.	480	3,000	1,225	2,000	5,563.
Width	North Slip, 196; South Slip, 162.	239-7¼ face of dock to center.		39	115	43	248.
Depth of water (feet)	21		22	22	22	24	22½.
Unloading equipment	15 Hoover and Mason unloaders; capacity, 220 tons per hour average, each.	3 Brown Hoisting Machinery Co. bridges, 525 gross tons per hour, average.	1 unloading bridge, electrically operated, with a capacity of 250 tons per hour.	4 combination unloading and stocking bridges.	3 Brown Hoisting Machinery Co. unloaders, 5-ton bucket; 3 storage bridges.	2 unloaders, 2 stocking bridges.	7 Hulett automatic unloaders; operating capacity 350 tons per hour average per machine per season.
Ground storage capacity (tons).	3,470,000	300,000	196,000	800,000	450,000	800,000	4,000,000.
Railroad connecting	Elgin, Joliet & Eastern Ry.	None	Pennsylvania R. R., Indiana Harbor Belt R. R.	Chicago Short Line R. R.	C. W. P. & S. R. R.	I. H. B. R. R. and E. J. & E. R. R.	Elgin, Joliet & Eastern Ry.
Tracks on dock:							
Number	1 at each dock	None	2	2	2	1	3.
Capacity, cars	North Dock, 35 30-foot cars; South Dock, 30 30-foot cars.		16	150, 40 feet long	35	50, 40 feet long	200, 50 feet long.
Supporting yards (railroad):				Chicago Short Line R. R.	C. W. P. & S. R. R.	I. H. B. R. R. and E. J. & E. R. R.	Kirk yard (E. J. & E.) Gary, normally not used for ore.
Number	1 at One hundredth Street, Chicago, and 1 at Gary, Kirk yard (both not normally used for ore).			1	1	2	1.

Distance from terminal.	One hundredth Street, 2 miles; Kirk yard, 13 miles.			½ mile	¾ mile	1 mile	2½ miles.
Capacity, cars				300	600	300	8,000.

Location	Detroit, Mich.	Dearborn, Mich.	Toledo, Ohio	Toledo, Ohio	Toledo, Ohio	Huron, Ohio	Lorain, Ohio
Name or number	Hanna Furnace Co.	Rouge Plant	Toledo Furnace Co.	Baltimore & Ohio R. R. Ore Dock.	New York Central R. R. Ore Dock.	Wheeling & Lake Erie R. R. Dock No. 1.	Baltimore & Ohio R. R. Dock.
Owner	do	Ford Motor Co	do	Baltimore & Ohio R. R.	New York Central R. R.	Wheeling & Lake Erie Dock Co.	Baltimore & Ohio R. R.
Type of construction	Reinforced concrete bulkhead.	Concrete	Concrete	Concrete bulkhead	Timber bulkhead	Concrete, earth fill	Concrete, earth fill.
Dimensions (feet):							
Length	1,100	2,614	1,720	1,400	800	1,400	906.
Width						200	554.
Depth of water	21	21	22	18.6–22	22	23	22.
Unloading equipment	Wellman-Seaver-Morgan ore cranes and 2 Brown hoist bridge cranes, electrically operated with capacity of 200 tons per hour each.	2 electric Huletts and 1 Mead-Morrison unloaders with 500-tons capacity each.	3 electrically operated Hoover & Mason unloaders with 5-ton buckets, capacity 150 tons each.	2 electric Hulett unloaders with 15-ton buckets with capacity of 500 tons per hour each.	3 electric Brown hoists with 5-ton buckets, capacity 235 tons per hour.	4 steam Hulett unloaders and 2 steam and hydraulic Hulett unloaders with 5 and 15-ton automatic buckets, respectively.	3 electric Brown unloaders with 9½-ton automatic buckets with capacity of from 260–300 tons each per hour.
Ground storage capacity (tons).	400,000	1,000,000	425,000	500,000	45,000	600,000	350,000.
Railroad connecting	Detroit, Toledo & Ironton and Michigan Central R. R.	Detroit, Toledo & Ironton R. R.	Wheeling & Lake Erie R. R.	Baltimore & Ohio R. R.	New York Central R. R.	Wheeling & Lake Erie R. R.	Baltimore & Ohio R. R.
Tracks on docks:							
Number	3	3	1	4	4	4	5.
Capacity, cars	48	156	40	100	48	198	80.
Supporting yards:							
Number		1	None	1	1	2	1.
Distance from terminal.		9 miles		½ mile	¼ mile	1 mile	½ mile.
Capacity, cars		384		1,500	400	2,500	500.

TABLE No. 151.—*Ore-unloading terminals*—Continued

Location	Lorain, Ohio	Cleveland, Ohio	Cleveland, Ohio	Cleveland, Ohio	Cleveland, Ohio	Cleveland, Ohio	Cleveland, Ohio
Name or number	National Dock Co.	Central Furnace Dock.	River Bed Ore Dock Co.	Dock No. 11	Otis Steel Co.	River Dock	Upson Dock Co.
Owner	U. S. Steel Corporation.	American Steel & Wire Co.	Erie Railroad Co.	Pennsylvania R. R.	do	River Dock Co.	Bourne Fuller Co.
Type of construction	Concrete, earth fill.	Concrete, earth fill.	Pile and timber, earth fill.	985 feet concrete, 400 feet pile and timber.	1,000 feet concrete, 500 feet pile and timber.	Pile, concrete superstructure.	Pile, concrete superstructure.
Dimensions (feet):							
Length	2,490	3,000	1,500	1,385	1,500	2,900	790.
Width	56	40	10	565			136.
Depth of water	22	21	22	23	20	22	21.
Unloading equipment	4 electric Huletts, 2 with 10-ton and 2 with 12-ton buckets, with a total capacity of 1,500 tons per hour.	4 electric Hoover & Mason unloading bridges with 7½-ton buckets; 2 Hulett unloading bridges with 10-ton bukets, 1 storage bridge.	4 electric 5-ton Brown unloaders, two 17½-ton Hulett unloaders, each with a capacity of 250 tons per hour.	Four 17-ton electric Hulett unloaders and 1 storage bridge with 15-ton clam, each with 500-ton capacity per hour.	2 steam McMyler and 2 steam Brown rebuilt unloading machines with 2 and 5 ton buckets, respectively.	3 electric 10-ton Hulett unloaders with capacity of 400 tons each per hour; 2 electric storage bridges with 10-ton clams.	1 Wellman-Seaver Morgan electric unloading bridge with 5-ton bucket, capacity 250 tons per hour.
Ground storage capacity (tons).	1,900,000	750,000	At north Randall 1,000,000 tons.	1,160,000	500,000	800,000	150,000.
Railroad connecting	Lake Terminal R. R.	Newburg and South Shore.	Erie R. R.	Pennsylvania R. R.	Cuyahoga River	River Terminal R. R. Co.	Erie R. R.
Tracks on dock:							
Number	2	6	3	27	2	4	2.
Capacity, cars	84	240	100	494	25	120	75.
Supporting yards:							
Number	2	1	1	2	1		
Distance from terminal.	1½; near	6 miles	Near by	⅛ mile; 13 miles	1,000 yards		
Capacity, cars	212; 65	350	669	258; 430	100		

Location	Fairport, Ohio	Ashtabula, Ohio	Ashtabula, Ohio	Ashtabula, Ohio	Conneaut, Ohio	Conneaut, Ohio	Erie, Pa.
Name or number	Pennsylvania & Lake Erie Dock Co.	Pennsylvania R. R. Dock No. 10.	New York Central R. R. Dock No. 1.	New York Central R. R. Dock No. 2.	Pittsburgh & Conneaut Dock No. 2.	Pittsburgh & Conneaut Dock No. 4.	Pennsylvania R. R. ore dock.
Owner	do	Pennsylvania R. R. Co.	New York Central R. R.	New York Central R. R. Co. Ext.	Bessemer & Lake Erie R. R.	Pittsburgh & Conneaut Dock Co.	Pennsylvania R. R.
Type of construction	Concrete, earth fill.	Concrete, on wood crib.	Concrete, earth fill.	Concrete, earth fill.	Pile and timber, earth fill.	Concrete and piling, earth fill.	Concrete, pile, and timber.
Dimensions (feet):							
Length	2,280	1,200	1,164	1,200	1,250	1,275	1,240.
Width	200	750	625	625	100	650	240.
Depth of water	22	23	25	25	22	22	25.

Unloading equipment	6 electric Brown unloaders with 5-ton buckets, capacity 200 tons per hour each; 1 storage bridge.	6 electric Hoover & Mason unloaders with 6-ton buckets, capacity 350 tons per hour each.	4 electric Hulett unloaders with 15-ton buckets, capacity 500 tons per hour each; 1 storage bridge, 15-ton clam.	4 electric Hulett unloaders with 10-ton buckets, capacity 500 tons per hour each; 1 storage bridge with 17-ton clam.	4 electric Brown unloaders with 5-ton buckets, capacity 225 tons per hour each.	5 electric Hulett unloaders with 15-ton buckets; 2 steam Huletts with 15-ton buckets, capacity first five 250 tons, second two 500 tons per hour.	1 Hulett machine with 10-ton bucket; 1 Mead-Morrison bridge with 9-ton bucket, 1 Mead-Morrison combination bridge and unloader, 10-ton bucket.
Ground storage capacity (tons).	325,000	1,000,000	1,000,000	1,000,000	None	1,400,000	300,000.
Railroad connecting	Baltimore & Ohio R. R.	Pennsylvania R. R.	New York Central R. R.	New York Central R. R.	Bessemer & Lake Erie R. R.	Bessemer & Lake Erie R. R.	Pennsylvania R. R.
Tracks on dock:							
Number	4	15	4	4	4	6	2.
Capacity, cars	200	460	200–300	200–300	100	250	100.
Supporting yards:							
Number	1	1	1	1	1	1	2.
Distance from terminal.	Adjacent	9 miles	6 miles	6 miles	Adjacent	Adjacent	¼ mile.
Capacity, cars						400–500	710.

Location	North Tonawanda, N. Y.	Buffalo, N. Y.	Buffalo, N. Y.	Buffalo, N. Y.	Buffalo, N. Y.
Name or number	Dock No. 1	Wickwire Spencer Steel Co	Buffalo Union Furnace "A"	Donner Steel Co	Buffalo, Rochester & Pittsburgh Ry.
Owner	Tonawanda Iron Corp	do	do	do	Do.
Type of construction	Concrete dock	Reinforced concrete	Timber, reinforced concrete	Piles and reinforced concrete	Timber crib.
Dimensions (feet):					
Length	500	1,045	1,442	1,188	350.
Width	200	63	150	241	
Depth of water	22	20	20	22	15–22.
Unloading equipment	1 Mead-Morrison bridge with 12-ton bucket.	1 electric Hulett unloader 10-ton bucket; 1 electric Brown hoist 7½-ton bucket, capacity 200 tons per hour each; one 5-ton Brown bridge; one 7½-ton Wellman-Seaver-Morgan, cantilever type.	2 electric Mead-Morrison bridges and 2 electric Brown hoist transfer bridges in conjunction. 9-ton buckets, capacity 300 tons per hour each.	2 electric Brown hoists, 7½-ton unloader and bridge combination; one 12-ton Mead-Morrison combination, capacity 250 tons per hour.	Two 10-ton hydraulic Huletts with capacity of 350 tons per hour each.
Ground storage capacity (tons).	200,000	550,000	450,000	650,000	None.
Railroad connecting	Erie, New York Central, and Lehigh Valley.	New York Central	Erie & Lake Shore R. R	Buffalo, Rochester & Pittsburgh, South Buffalo Ry.	Buffalo, Rochester & Pittsburgh Ry.
Tracks on dock:					
Number	None	2	1	1	4.
Capacity, cars		50	36	30	40.
Supporting yards:					
Number	None	None	None	1	1.
Distance from terminal				South Buffalo adjacent	Adjacent.
Capacity, cars				500	400.

TABLE NO. 151.—*Ore-unloading terminals*—Continued

Location	Buffalo, N. Y.	Buffalo, N. Y.	Buffalo, N. Y.	Buffalo, N. Y.	Buffalo, N. Y.
Name or number	West Shore Dock	Pennsylvania R. R. Dock	Lehigh Valley R. R. Dock	Bethlehem Steel Co. Dock	Buffalo Union Furnace "B."
Owner	New York Central R. R.	Pennsylvania R. R.	do	do	Do.
Type of construction	Pile and timber	Reinforced concrete	Timber crib	Pile-concrete superstructure	Pile-concrete superstructure.
Dimensions (feet):					
Length	1,000	1,000 x 60	1,700	4,000 x 200	2,185.
Depth of water	22	22	23	23	22.
Unloading equipment	Three 6-ton electric Brown hoists with capacity of 325 tons per hour each.	One 10-ton electric Hulett with capacity of 300 tons per hour and two 10-ton Brown hoists with capacity of 200 tons per hour each.	Two 100-ton steam McMeiler whirlies.	Five 10-ton electric Huletts; three 7½-ton Wellman-Seaver-Morgan transfer bridge; two 17-ton Huletts.	6 electric Brown hoist traveling bridge unloaders, 2 with 6-ton buckets and 4 with 5-ton buckets.
Ground storage capacity (tons).	80,000	700,000	210,000	2,000,000	880,000.
Railroad connecting	West Shore R. R.	Pennsylvania R. R.	Lehigh Valley R. R.	South Buffalo R. R.	South Buffalo; Pennsylvania, Lehigh Valley R. R.
Tracks on docks:					
Number	4	3	4	5	1.
Capacity, cars	46	100	80	260	55.
Supporting yards:					
Number	1	1	1	1	None.
Distance from terminal	Adjacent	Adjacent	Adjacent	Adjacent	
Capacity, cars	300	1,500	80		
Remarks				Same used for coal	

ERIE RAILROAD ORE UNLOADERS, CLEVELAND, OHIO (ONE 15-TON BUCKET, ONE 17-TON BUCKET, AND FOUR 8-TON BUCKETS)

PENNSYLVANIA RAILROAD ORE UNLOADING DOCK, ASHTABULA, OHIO

BULK FREIGHT STEAMER "WILLIAM EDENBORN" UNLOADING ORE AT PLANT OF AMERICAN STEEL & WIRE CO., CLEVELAND, OHIO

MOVEMENT OF IRON ORE FROM LAKE PORTS TO SMELTERS

The movement of iron ore from lake ports to interior consuming furnaces is an all-rail movement. The greater bulk of the ore is loaded direct from the lake ore carriers by huge unloading machines into railway cars for direct shipment to the blast furnaces. These machines are capable of unloading from 5 to 17 tons at one operation. The railways handling this ore movement do not have special equipment but use ordinary gondola and hopper cars. During the winter season and in slack periods, ore is loaded from stock piles located on or near the docks.

Tracing the movement of ore from the time it reaches lower lake ports we find that it is sampled while still in the vessel or while it is being unloaded. When the ore cars reach the furnaces the ore is sampled again and then allowed to be placed in the furnace stock piles. The sampling of ore is an important part of the ore movement as the furnace operator must know what grade of ore he is receiving in order to create the proper mixture for successful production of iron and steel.

The flow of ore from Lake Erie ports to interior furnaces amounted to 27,036,946 tons and consumption at local furnaces accounted for 10,013,925 tons, making a grand total of 37,050,871 long tons distributed from the docks at Lake Erie ports.

Pittsburgh led all the consuming districts in the receipt of ore from Lake Erie ports with a total of 12,948,274 tons. Valleys, Steubenville, and Johnstown ranked next with 7,415,789, 2,328,817, and 1,932,582 tons, respectively. Receipts at various other points ranged from 329 tons which moved to New England to 660,097 tons at Canton.

Conneaut ranked first in the shipments of ore to the interior with 8,431,615 tons. Of this tonnage, Pittsburgh received 7,883,469 tons and Valleys 548,146 tons.

Ashtabula shipped 6,616,027 tons to the interior, placing itself second in this movement. Shipments were distributed mainly to Pittsburgh which received 3,427,087 tons, Valleys, 2,085,403 tons, Johnstown, 812,956 tons, and minor shipments to Steubenville, Canton, and Wheeling, totaling 284,789 tons.

Cleveland ranks third in shipments to the interior, with a total of 6,214,287 tons. The largest shipments from this port were 2,314,562 tons to Valleys, 1,198,573 tons to Pittsburgh, 1,034,004 tons to Johnstown, and 991,637 tons to Steubenville. The remaining 675,511 tons were distributed to Canton, Portsmouth, Wheeling, Ironton, Columbus, and 329 tons to New England.

Fairport, like Conneaut, shipped 1,842,662 tons entirely to Pittsburgh and Valleys, the greater amount going to Valleys with Pittsburgh receiving only 80,688 tons. There were 1,627,784 tons moved

from Lorain, which were received at Valleys, Steubenville, Pittsburgh, Canton, and Wheeling. Huron shipped 1,018,575 tons to the interior, of which Steubenville received 589,564 tons; Canton, 402,503 tons; and Pittsburgh, 26,508 tons. Toledo moved 814,766 tons to points in the State of Ohio. Erie and Buffalo shipped 440,758 and 30,472 tons, respectively.

Furnaces located at Lake Erie ports consumed a total of 10,013,925 tons of ore. Buffalo was the largest local consumer, with 4,142,384 tons, or practically all of the ore received. Cleveland ranked second in local consumption with 3,109,256 tons, approximately one-third the total receipts. Lorain retained more for local use than it shipped inland, local consumption totaling 1,839,819 tons. Toledo and Erie consumed locally 705,524 and 216,942 tons, respectively.

Port Colborne received 165,494 tons of ore from upper lake ports and consumed the entire amount locally.

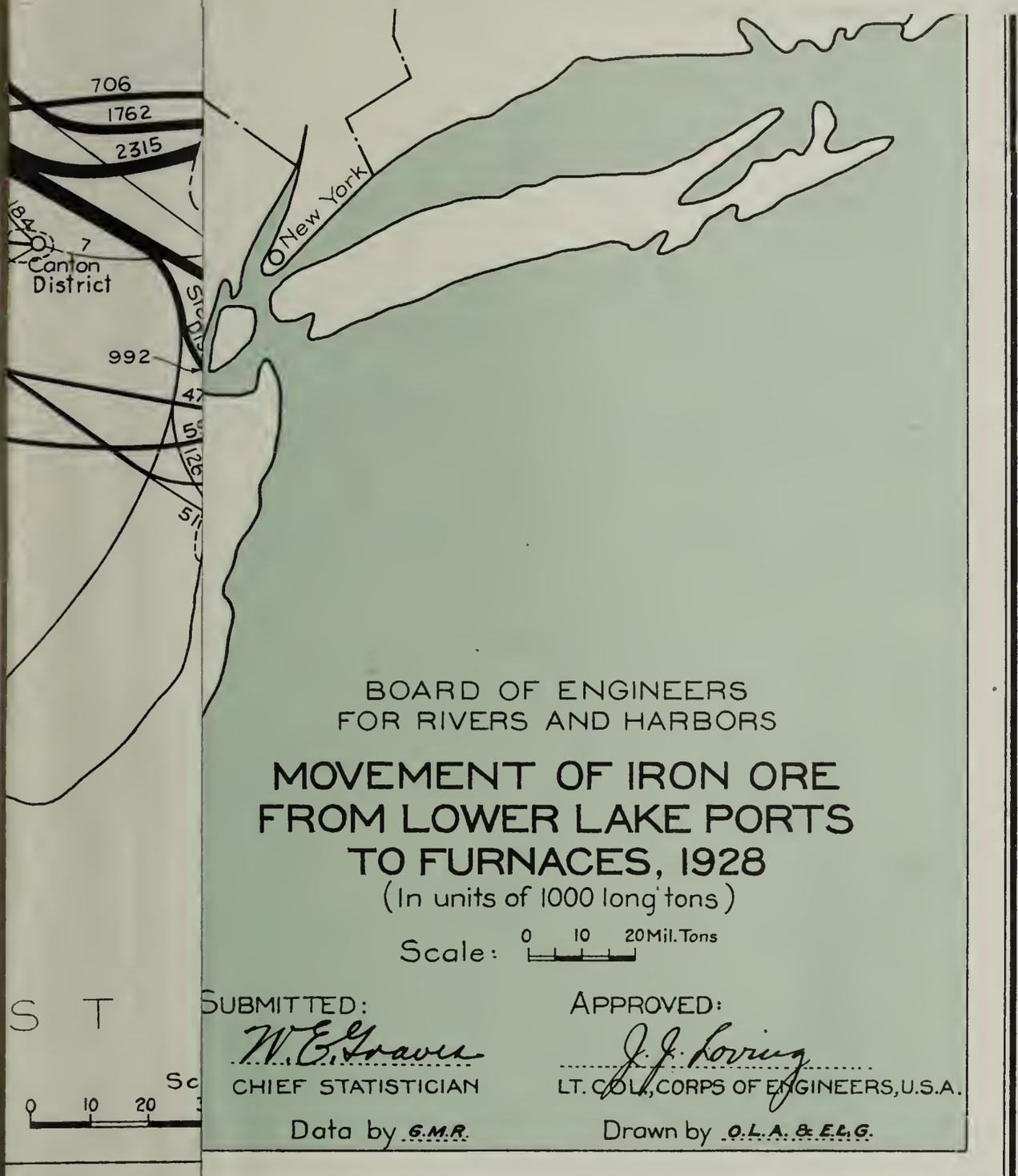
Table No. 152 compiled from the records of the Lake Superior Iron Ore Association gives a detailed statement of the movement from Lake Erie ports to interior consuming points and the amount of ore used at furnaces located on the lake front.

TABLE No. 152.—*Distribution of iron ore from Lake Erie ports to consuming districts (season 1928)*

[Quantities in long tons]

	Toledo	Huron	Lorain	Cleveland	Fairport
Hamilton	246,585				
Jackson	158,066				
Portsmouth	169,125			143,215	
Ironton [1]	149,201			125,720	
Columbus	91,789			81,184	
Wheeling [2]			50,756	126,424	
Canton [3]		402,503	66,914	183,975	
Pittsburgh [4]		26,508	331,949	1,198,573	80,688
Steubenville [5]		589,564	472,461	991,637	
Valleys [6]			705,704	2,314,562	1,761,974
Johnstown				1,034,004	
Dubois					
Eastern Pennsylvania and Maryland					
Troy					
New England				329	
Miscellaneous				14,664	
Total	814,766	1,018,575	1,627,784	6,214,287	1,842,662
Local consumption	705,524		1,839,819	3,109,256	
Total	1,520,290	1,018,575	3,467,603	9,323,543	1,842,662

[1] All tonnage to Ashland, Ky.
[2] All tonnage to Martins Ferry and Benwood.
[3] Includes Massillon.
[4] Includes North Bessemer, Clairton, Donora, Etna, Rankin, McKeesport, Midland, Monessen, South Duquesne, and Woodlawn.
[5] Includes Mingo Junction and Weirton.
[6] Includes Hubbard, Leetonia, Lowellville, Struthers, Warren, Youngstown, Farrell, New Castle, Sharon, and Sharpsville.



BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF IRON ORE FROM LOWER LAKE PORTS TO FURNACES, 1928

(In units of 1000 long tons)

Scale: 0 10 20 Mil. Tons

SUBMITTED:

W. E. Graves

CHIEF STATISTICIAN

APPROVED:

J. J. Loving

LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by G.M.R.

Drawn by O.L.A. & E.L.G.

WILLIAMS & HEINTZ CO., WASH., D. C.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S.ARMY.

MOVEMENT OF IRON ORE FROM LOWER LAKE PORTS TO FURNACES, 1928

(In units of 1000 long tons)

BOARD OF ENGINEERS FOR RIVERS AND HARBORS

Scale: 0 10 20 Mil. Tons

Scale of Miles 0 10 20 30 40 50 60 70 80

SUBMITTED: W. E. Gravell, CHIEF STATISTICIAN

APPROVED: J. J. Loring, LT. COL., CORPS OF ENGINEERS, U.S.A.

Data by G.M.R.

Drawn by O.L.A. & E.L.G.

CANADA

LAKE ONTARIO

LAKE ERIE

Hamilton

519

Point Edward

MICH.

BUFFALO

Misc. 2

4173

4143 Local

NEW YORK

Troy

VERMONT

NEW HAMP

MASS

CONN

ERIE

638

217 Local

Misc. 15

CONNEAUT

8432

ASHTABULA

6616

Misc. 6

TOLEDO

1520

705 Local

FAIRPORT

1643

HURON

3469

1019

LORAIN

9324

CLEVELAND Misc. 15

3109 Local

1840 Local

706

1762

2315

VALLEY DISTRICT

2085

548

Dubois

7

PENNSYLVANIA

402

184

7

Canton District

67

992

Steubenville

1057

472

590

126

57

Wheeling District

81

9421

7884

Pittsburgh District

1199

27

332

813

85

Johnstown

1034

341

19

New York

Bethlehem

NEW

Harrisburg

Lebanon

Reading

EASTERN PENNSYLVANIA AND MARYLAND DISTRICT

Philadelphia

92

81

Columbus

OHIO

247

Hamilton

158

Jackson

169

143

149

126

Portsmouth

IRONTON DISTRICT

WEST VIRGINIA

KENTUCKY

MARYLAND

Sporrows Point

JERSEY

VIRGINIA

DEL.

WILLIAMS & HEINTZ CO. WASH. D.C.

TABLE No. 152.—*Distribution of iron ore from Lake Erie ports to consuming districts (season 1928)*—Continued

	Ashtabula	Conneaut	Erie	Buffalo [1]	Total
Hamilton					246,585
Jackson					158,066
Portsmouth					312,340
Ironton [2]					274,921
Columbus					172,973
Wheeling [3]	2,929				180,109
Canton [4]	6,705				660,097
Pittsburgh [5]	3,427,087	7,883,469			12,948,274
Steubenville [6]	275,155				2,328,817
Valleys [7]	2,085,403	548,146			7,415,789
Johnstown	812,956		84,937	685	1,932,582
Dubois				6,790	6,790
Eastern Pennsylvania and Maryland			340,566	19,288	359,854
Troy				1,373	1,373
New England					329
Miscellaneous	5,792		15,255	2,336	38,047
Total	6,616,027	8,431,615	440,758	30,472	27,036,946
Local consumption			216,942	4,142,384	10,013,925
Total	6,616,027	8,431,615	657,700	4,172,856	37,050,871

[1] Includes Tonawanda. Port Colborne received and consumed locally 165,494 tons.
[2] All tonnage to Ashland, Ky.
[3] All tonnage to Martins Ferry and Benwood.
[4] Includes Massilon.
[5] Includes North Bessemer, Clairton, Donora, Etna, Rankin, McKeesport, Midland, Monessen, South Duquesne, and Woodlawn.
[6] Includes Mingo Junction and Weirton.
[7] Includes Hubbard, Leetonia, Lowellville, Struthers, Warren, Youngstown, Farrell, New Castle, Sharon, and Sharpsville.

Source: L. S. I. O. A.

The movement of ore from Lake Michigan ports was confined to 392,011 gross tons from South Chicago to Granite City (East St. Louis) and a winter movement to Gary and Joliet of 36,790 gross tons, the majority of which moved to Joliet for points beyond the railway lines carrying the ore from the lake front. However, this latter movement is decreasing each year and has now become practically an emergency movement.

The chart on the opposite page shows graphically the movement from lake ports to interior smelting districts.

IRON ORE ON LAKE ERIE DOCKS

As the greater bulk of the ore moved to Lake Erie ports is received prior to December 1, the dock balances as of this date represent the total reserve at lake front. This reserve is drawn upon by interior furnaces to meet their demands during the winter when lake navigation has stopped. In recent years, however, there appears to be a tendency to reduce the amount of ore held at lake front and to ship direct from shipside to furnaces. Statistics presented in table No. 153 show that dock balances on December 1 have been reduced gradually from 8,049,276 tons in 1924 to 6,454,126 tons in 1928. This supply appears to be adequate to meet present conditions. In the season 1924 and 1925 shipments amounted to 3,746,214 tons and were gradually reduced to 1,761,927 tons in 1927 and 1928, but increased in 1928 and 1929 to 2,807,580 tons. This table also shows the balances left on the docks at the beginning of the navigation season on May 1.

TABLE No. 153.—*Iron ore balances on Lake Erie docks and shipments to interior from stock piles 1924–1928*

[Expressed in long tons]

Ports	Balance on dock Dec. 1, 1928	Balance on dock May 1, 1929	Shipments to interior	Balance on dock Dec. 1, 1927	Balance on dock May 1, 1928
Toledo	64,552	34,438	30,114	83,507	81,504
Huron	392,331	332,661	59,670	475,238	380,646
Lorain	85,121	59,986	25,135	208,848	129,813
Cleveland	1,184,347	777,272	407,075	1,262,885	1,132,135
Fairport	392,812	182,126	210,686	458,154	286,671
Ashtabula	2,274,554	1,068,830	1,205,724	2,495,490	1,806,473
Conneaut	1,996,504	1,131,197	865,307	1,886,067	1,295,905
Erie	59,695	58,203	1,492	67,948	64,162
Buffalo	4,210	1,833	2,377	6,178	5,279
Total	6,454,126	3,646,546	2,807,580	6,944,315	5,182,388

Ports	Shipments to interior	Balance on dock Dec. 1, 1926	Balance on dock May 1, 1927	Shipments to interior	Balance on dock Dec. 1, 1925
Toledo	2,003	84,336	84,202	134	86,003
Huron	94,592	606,897	389,782	217,115	548,095
Lorain	79,035	319,040	137,195	181,845	703,331
Cleveland	130,750	1,236,446	1,000,462	235,984	1,251,411
Fairport	171,483	471,686	252,221	219,465	485,648
Ashtabula	689,017	2,731,492	1,697,148	1,034,344	2,504,098
Conneaut	590,162	2,107,130	1,041,672	1,065,458	2,101,486
Erie	3,786	87,248	80,944	6,304	107,856
Buffalo	899	18,525	19,668	[1]	68,226
Total	1,761,927	7,662,800	4,703,294	2,959,506	7,856,154

Ports	Balance on dock May 1, 1926	Shipments to interior	Balance on dock Dec. 1, 1924	Balance on dock May 1, 1925	Shipments to interior
Toledo	71,857	14,146	222,532	144,925	76,607
Huron	474,714	73,381	549,572	456,279	93,293
Lorain	303,947	399,384	704,724	257,976	446,748
Cleveland	920,350	331,061	1,489,899	1,106,114	383,785
Fairport	294,363	191,285	470,671	268,634	202,037
Ashtabula	1,546,798	957,300	2,269,033	1,139,435	1,129,598
Conneaut	813,129	1,288,357	1,990,833	777,638	1,213,195
Erie	88,144	19,712	253,009	68,534	184,475
Buffalo	62,088	6,138	100,003	83,527	16,476
Total	4,575,390	3,280,764	8,049,276	4,303,062	3,746,214

[1] Buffalo received a shipment of ore prior to May 1, which was included in the balance as of that date.

RAIL AND LAKE RATES ON IRON ORE, 1929

The rates on iron ore from ranges to ports in the Lake Superior region are from 59 to 90 cents per gross ton. These rates are exclusive of handling and storage charges at the port. From the Marquette Range to Marquette there are two rates, one on ore destined to this port for local consumption and the other on ore for further distribution by rail. These rates are 59 and 68 cents per gross ton, depending upon the points of origin. On ore destined to points beyond, via lake, the proportional rates of 54 and 60 cents per gross ton are named. In addition to this last, a charge of 10 cents per gross ton for handling is made. If ore is kept in storage in cars at the dockyards over 10 days a storage charge of one-fourth cent per gross ton for each day or fraction thereof is assessed.

From the Menominee and Marquette Ranges to the dockyards at Escanaba and from the Gogebic Range to the dockyards at Ash-

land the rate is 72 cents per gross ton. If destined to furnace tracks at either port, the rate is 81 cents per gross ton. The handling and storage charges are the same as those in effect at Marquette.

A proportional rate of 81 cents per gross ton, on ore destined to points beyond, via lake, is named, from the Vermilion and Mesabi Ranges to dockyards at Two Harbors, and from the Mesabi and Cuyuna Ranges to dockyards at Duluth and Superior. This rate includes assembling, weighing, and assorting at originating points. In addition to the above, a charge of 10 cents per gross ton is assessed for handling ore from yards to vessels. The storage charges in force are the same as those at the previously named ports. The following tables show the rates in effect in November, 1929, from points of origin to ports and a summary of rates from 1855 to the present time.

TABLE No. 154.—*Rates on iron ore, carloads*

[In effect Oct. 25, 1929. Rates are all stated in cents per ton of 2,240 pounds]

From—	To—						
	Marquette, Mich.	Escanaba, Mich.		Ashland, Wis.		Two Harbors, Minn. (ore docks)	Duluth, Minn. (ore docks)
		To dockyards	To furnace tracks	To dockyards	To furnace tracks		
Ishpeming, Mich	[1] [3] [4] 59	[3] 72	81				
Negaunee, Mich	[1] [3] [4] 59	[3] 72	81				
Michigamme, Mich	[2] [3] [4] 68	[3] 72	81				
Republic, Mich	[2] [3] [4] 68	[2] 72	81				
Champion, Mich	[2] [3] [4] 68	[3] 72	81				
Florence, Wis		[3] 72	81				
Iron Mountain, Mich		[3] 72	81				
Vulcan, Mich		[3] 72	81				
Mellen, Wis				[3] 72	81		
Ironwood, Mich				[3] 72	81		
Bessemer, Mich				[3] 72	81		
Moore, Wis				[3] 72	81		
Mesaba, Minn						[5] 81	[8] 90
Tower Junction, Minn						[5] 81	
Ely, Minn						[5] 81	
Biwabik, Minn						[5] 81	[3] [5] [6] 81
Mountain Iron, Minn							[3] [5] [6] 81
Hibbing, Minn							[3] [5] [6] 81
Eveleth, Minn							[3] [5] [6] 81
Algoma Mine, Minn Clark Mine, Minn Crosby, Minn Cuyuna, Minn Cuyuna Mille Lacs, Minn Cuyuna Saltana, Minn Ironton, Minn Kennedy, Minn., and various other mines and points in the same general territory as Aitkin and Brainerd, Minn							[3] [7] [8] 81

[1] The rate to dockyards when destined beyond via lake is 54 cents per ton of 2,240 pounds.
[2] The rate to dockyards when destined beyond via lake is 60 cents per ton of 2,240 pounds.
[3] When for vessel delivery to points beyond, via lake the rate to dockyards is subject to the following additional charges: For storage in cars at dockyards unloading from cars to dock, and loading into vessels if loaded into vessel within 10 days from arrival of cars at dockyards—10 cents per ton of 2,240 pounds. When not loaded into vessel within 10 days a storage charge of one-fourth cent per gross ton, per day, applies for each day or fraction thereof after the first 10 days.
[4] On ore for transshipment to boats at Marquette, rates apply to dockyards only.
[5] This rate includes assembling at originating points, weighing, and assorting.
[6] Proportional rate and applies when traffic is destined to points beyond the ore docks and without the State of Minnesota (via lake) and when such transportation forms a part of the carriage of such ore to points without the State of Minnesota via lake.
[7] Rate applies only when for points beyond via lake—when for delivery at Duluth or Superior or when for points beyond via all-rail routes a rate of 90 cents per gross ton applies.
[8] Rate includes assembling at originating points.

Tariff authorities: Duluth, South Shore & Atlantic, I. C. C., 3628, 3415; Duluth, Missabe & Northern, I. C. C., 549; Soo Line, I. C. C., 6305; Chicago & Northwestern, I. C. C., 9619; and Duluth & Iron Range R. R., I. C. C., 377 and 379.

TABLE NO. 155.—*Rail freight rates on iron ore from mines to lake shipping points*

Year	Marquette Range		Menominee Range	Gogebic Range, Ashland		Mesabi and Vermilion Ranges				
								To Two Harbors from—		
	Marquette	Escanaba	Escanaba	Wis. Cent. Ry.	C. & N. W. Ry.	Duluth	Superior	Ely	Tower and Soudan	Other points
1855	$3.00									
1856	1.27									
1857	1.27									
1858	.87									
1859	.87									
1860	1.09									
1861	1.09									
1862	1.09									
1863	1.09									
1864	1.09									
1865	1.10									
1866	1.10	$1.55								
1867	1.10	1.80								
1868	1.10	1.80								
1869	1.10	1.85								
1870	1.10	1.85								
1871	.95	1.70								
1872	.84	1.70								
1873	.84	2.00								
1874	.84	2.00								
1875	.65	1.25								
1876	.55	1.15								
1877	55	1.15								
1878	.55	1.15								
1879	.55	1.15								
1880	.55	1.25								
1881	55	1.25								
1882	.55	1.25								
1883	.55	1.10								
1884	.40	.80								
1885	.45	.80								
1886	55	.80								
1887	.55	.80	$0.85	$0.80	$0.80					
1888	.45	.70	.75	.70	.70					
1889	.45	.70	.75	.70	.70					
1890	.45	.70		.70						
1891	.45	.70	.70	.65	.65					
1892	.40	.65	.70	.65	.65	$0.80	$0.80	$1.00	$0.90	$0.80
1893	.40	.65	.70	.65	.65	.80	.80	1.00	.90	.80
1894	.32	.52	.70	.52	.65	.80	.80	1.00	.90	.80
1895	.32	.52	.52	.52	.52	.80	.80	1.00	.90	.80
1896	.32	.52	.52	.52	.52	.80	.80	1.00	.90	.80
1897	.32	.52	.52	.45	.52	80	.80	1.00	.90	.80
1898	.32	.40	.45	.40	.45	.80	.80	1.00	.90	.80
1899	.25	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1900	.25	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1901	.25	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1902	.25	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1903	.25	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1904	.25	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1905	.32	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1906	.32	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1907	.32	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1908	.32	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1909	.32	.40	.40	.40	.40	.80	.80	1.00	.90	.80
1910	.32	.40	.40	.40	.80	.80	1.00	.90	.80	
1911	.32	.40	.40	.40	.80	.80	1.00	.90	.80	.65
1912	.32	.40	.40	.40	.60	.60	.60	.60	.60	.60
1913	.32	.40	.40	.40	.60	.60	.60	.60	.60	.60
1914	.32	.40	.40	.40	.60	.60	.60	.60	.60	.60
1915	.32	.40	.40	.40	.55	.55	.55	.55	.55	.55
1916	.32	.40	.40	.40	.55	.55	.55	.55	.55	.55
1917	.32	.40	.40	.40	.55	.55	.55	.55	.55	.55
1918	.39½ [1]	.51	.51	.51	.63½	.63½	.63½	.63½	.63½	.63½
	1.65 [1]	.85	.85	.85	.85	1.00	1.00	1.00	1.00	1.00
1919	.65	.85	.85	.85	.85	1.00	1.00	1.00	1.00	1.00
1920	.65	.85	.85	.85	.85	1.00	1.00	1.00	1.00	1.00
1921	.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1922	.65	.90	.90	.90	.90	.90	.90	.95	.95	.95
	2.59 [2]	.81	.81	.81	81	.86	.86	.86	.86	.86
1923	.54	.72	.72	.72	.72	.86	.86	.86	.86	.86
1924 to 1928, incl.	.54	.72	.72	.72	.72	.86	.86	.86	.86	.86
						81 [3]	81 [3]			

[1] From June 25, Marquette and Menominee rates included charge of 5 cents for handling and storage previous to 1921. Charge for handling and storage in 1921 was 10 cents.

[2] From June 19, 1922.

[3] Until Nov. 21, 1924, rates to Duluth and Superior were 86 cents with a charge of 5 cents for handling and storage. On Nov. 21, 1924, rail rate was reduced 5 cents to 81 cents and handling charges were increased to 10 cents.

NOTE.—The rail rate on iron ore shipped from the Cuyuna Range to Ashland was 60 cents during the years 1912, 1913, and 1914, and 55 cents in 1915, 1916, and 1917. In 1918 the rate was 63½ cents to June 25, and $1 thereafter. In 1919, 1920, and 1921 rate was $1.

The lake rates on iron ore are subject to considerable fluctuation, due mainly to the supply of and demand for vessels. Rates to Lake Erie ports are equal from specified groups of shipping ports. Two Harbors, Duluth, Superior, and Ashland are in one group, Marquette another, and Escanaba a third. To Lake Michigan ports, equal rates are named from all Lake Superior ports, while Escanaba enjoys a lower rate due to the shorter haul.

The following table shows the rates from shipping ports to Lake Erie ports from 1855 to 1928:

TABLE No. 156.—*Lake freight rates on iron ore*

[From ports named to Lake Erie]

Year	Escanaba	Marquette	Ashland and other ports at head of Lake Superior	Year	Escanaba	Marquette	Ashland and other ports at head of Lake Superior
1855		$3.00		1890	$0.99	$1.16	$1.26
1856		3.00		1891	.74	.96	1.05
1857		2.67		1892	.87	1.06	1.20
1858		2.09		1893	.70	.85	.88
1859		2.00		1894	.53	.70	.79
1860		2.00		1895	.64	.83	.96
1861		2.21		1896	.61	.80	.91
1862		2.89		1897	.45	.60	.63
1863		3.19		1898	.48	.60	.61
1864		3.37		1899	.72	.84	.95
1865		3.23		1900	.85	.94	1.05
1866	$3.77	4.17		1901	.62	.74	.84
1867	3.28	2.98		1902	.59	.68	.76
1868	2.44	3.11		1903	.63	.73	.83
1869	2.43	3.21		1904	.54	.61	.70
1870	2.40	3.06		1905	.60	.70	.76
1871	2.07	2.83		1906	.60	.70	.75
1872	2.50	3.59		1907	.60	.70	.75
1873	2.74	3.44		1908	.50	.60	.65
1874	(1)	3.84		1909	.50	.60	.65
1875	(1)	2.87		1910	.55	.65	.70
1876	(1)	2.54		1911	.45	.65	.60
1877	(1)	1.40		1912	.35	.45	.50
1878	.85	1.26		1913	.40	.50	.55
1879	1.07	1.61		1914	.35	.45	.50
1880	1.77	2.50		1915	.35	.45	.50
1881	1.55	2.25		1916	.45	.55	.60
1882	1.22	1.50		1917	.75	.90	1.00
1883	1.11	1.30		1918	.85	1.00	1.10
1884	.98	1.21		1919	.60	.72	.80
1885	.85	1.01	$1.20	1920	.85	1.00	1.10
1886	1.16	1.35	1.49	1921	.60	.72	.80
1887	1.49	1.75	2.11	1922	.52½	.63	.70
1888	.97	1.22	1.34	1923	.60	.72	.80
1889	1.00	1.14	1.29	1924 to 1928, inclusive	.52½	.63	.70

[1] No shipment.

Rates from Lake Erie ports to interior points are divided into two classes, "direct ore" and "dock ore." "Direct ore" is the ore which is loaded direct from vessel to cars for immediate shipment to interior points while "dock ore" is the ore which is transferred from vessel to stock pile to await further orders for distribution. On "direct ore" the line-haul charge varies from $3.16 per gross ton from Erie to Lebanon, Pa., to 74 cents per gross ton from Cleveland to Columbus, Ohio. A uniform charge of 8 cents per gross ton is assessed for handling ore from the rail of the vessel to cars. At the

docks of the railroad companies a charge of 13 cents per gross ton is assessed for lifting the ore from the hold to the vessel's rail. This charge, however, is against the ship and not the cargo.

On "dock ore" there are two charges against the ore, one for handling from the rail of the vessel to the dock and one for handling from dock to cars. The former is a uniform charge of 20 cents per gross ton and the latter a uniform charge of 13 cents per gross ton, making a difference of 25 cents per gross ton in favor of "direct ore," as the line-haul rate in both cases is the same. The increased cost of "dock ore" over "direct ore" is probably due to two reasons, the first being that the cost of handling from vessel to storage pile is greater than to cars, and the second being that the railroad at whose dock the vessel is unloading may not get the line haul. The railroads are usually willing to stand part of the handling charges when they receive the line haul.

The following tables show the rates on ore from Lake Erie ports to interior points in effect in October, 1929:

TABLE NO. 157.—*Freight rates on iron ore, carloads (ex-lake)*

[Rates in effect Oct. 26, 1929. In cents per ton of 2,240 pounds]

From	To	Direct ore			Dock ore			
		Line-haul rate	Handling rail of vessel to car	Total charge rail of vessel to destination	Line-haul rate	Handling rail of vessel to dock	Handling dock to car	Total charge rail of vessel to destination
Baltimore & Ohio R. R. Docks:								
Toledo, Ohio	Hamilton, Ohio	90	8	98	90	20	13	123
	Jackson, Ohio	90	8	98	90	20	13	123
	Portsmouth, Ohio	125	8	133	125	20	13	158
	Ironton, Ohio	125	8	133	125	20	13	158
	Columbus, Ohio	74	8	82	74	20	13	107
Wheeling & Lake Erie R. R. Docks:								
Huron, Ohio	Canton, Ohio	82	8	90	82	20	13	115
	Wheeling, W. Va.	115	8	123	115	20	13	148
	Steubenville, Ohio	99	8	107	99	20	13	132
	Pittsburgh, Pa.	115	8	123	115	20	13	148
	Youngstown, Ohio	-------	-------	-------	82	20	13	115
Baltimore & Ohio R. R. Docks:								
Lorain, Ohio	Dover, Ohio	88	8	96	88	20	13	121
	Wheeling, W. Va.	115	8	123	115	20	13	148
	Scottdale, Pa.	130	8	138	130	20	13	163
	New Castle, Pa.	88	8	96	88	20	13	121
	Pittsburgh, Pa.	115	8	123	115	20	13	148
	Sharon, Pa.	[1] 82	-------	-------	-------	-------	-------	-------
	Youngstown, Ohio	82	8	90	82	20	13	115
	Steubenville, Ohio	99	-------	-------	-------	-------	-------	-------
Cleveland, Ohio	Portsmouth, Ohio	125	-------	-------	-------	-------	-------	-------
	Ironton, Ohio	125	-------	-------	-------	-------	-------	-------
	Columbus, Ohio	74	-------	-------	-------	-------	-------	-------
	Richmond, Va.	276	-------	-------	-------	-------	-------	-------
	Roanoke, Va.	207	-------	-------	-------	-------	-------	-------
	Dover, Ohio	88	-------	-------	-------	-------	-------	-------
	Canton, Ohio	82	-------	-------	-------	-------	-------	-------
	Wheeling, W. Va.	115	-------	-------	-------	-------	-------	-------
	Steubenville, Ohio	99	-------	-------	-------	-------	-------	-------
	Kittanning, Pa.	115	-------	-------	-------	-------	-------	-------
	Scottdale, Pa.	130	-------	-------	-------	-------	-------	-------
	New Castle, Pa.	88	-------	-------	-------	-------	-------	-------
	Pittsburgh, Pa.	115	-------	-------	-------	-------	-------	-------
	Leetonia, Ohio	88	-------	-------	-------	-------	-------	-------
	Youngstown, Ohio	82	-------	-------	-------	-------	-------	-------
	Josephine, Pa.	130	-------	-------	-------	-------	-------	-------

[1] This is a proportional rate applying on ex-lake ore from the docks owned and operated by the National Tube Co. located on the Lake Terminal R. R. at Lorain, and does not include the service of placing cars at point of unloading on private industry tracks at destination. Rate applies after ore has been loaded into car on tracks of the National Tube Co. Handling charges, if any, are not on file with the Interstate Commerce Commission.

TABLE NO. 157.—*Freight rates on iron ore, carloads (ex-lake)*—Continued

[Rates in effect Oct. 26, 1929. In cents per ton of 2,240 pounds]

From	To	Direct ore			Dock ore			
		Line-haul rate	Handling rail of vessel to car	Total charge rail of vessel to destination	Line-haul rate	Handling rail of vessel to car	Handling dock to car	Total charge rail of vessel to destination
Baltimore & Ohio R. R. Docks—Contd,								
Fairport Harbor, Ohio.	New Castle, Pa	88						
	Pittsburgh, Pa	115						
	Youngstown, Ohio	82						
Pennsylvania Railroad Docks:								
Cleveland and Ashtabula, Ohio	Dover, Ohio	88	8	96	88	20	13	121
	Canton, Ohio	82	8	90	82	20	13	115
	Wheeling, W. Va	115	8	123	115	20	13	148
	Steubenville, Ohio	99	8	107	99	20	13	132
	Kittanning, Pa	115	8	123	115	20	13	148
	Scottdale, Pa	130	8	138	130	20	13	163
	New Castle, Pa	88	8	96	88	20	13	121
	Pittsburgh, Pa	115	8	123	115	20	13	148
	Sharon, Pa	82	8	90	82	20	13	115
	Leetonia, Ohio	88	8	96	88	20	13	121
	Youngstown, Ohio	82	8	90	82	20	13	115
	Johnstown, Pa	130	8	138	130	20	13	163
	Josephine, Pa	130	8	138	130	20	13	163
Bessemer & Lake Erie R. R. Docks:								
Conneaut Harbor, Ohio.	Pittsburgh, Pa	115	8	123	115	20	13	148
	Saxton, Pa	173	8	181	173	20	13	206
Pennsylvania R. R. Docks:								
Erie, Pa	Leetonia, Ohio	88	8	96	88	20	13	121
	Youngstown, Ohio	82	8	90	82	20	13	115
	Johnstown, Pa	130	8	138	130	20	13	163
	Lebanon, Pa	316	8	324	316	20	13	349
	Harrisburg, Pa	280	8	288	280	20	13	313
Buffalo, Rochester, & Pittsburgh R. R. Docks:								
Buffalo, N. Y	Du Bois, Pa	88	8	96				
	Josephine, Pa	107	8	115				
	Punxsutawney, Pa	88	8	96				
	Port Henry, N. Y	194	8	202	194	20	13	227
Privately owned docks.	Reading, Pa	194						
	Philadelphia, Pa	194						
	Harrisburg, Pa	194						
	Bethlehem, Pa	194						
	Wharton, N. J	194						

NOTE.—It will be noted from the foregoing table that where line-haul rates only are named, they apply after ore has been loaded into cars, and from privately owned docks. The handling charges of said privately owned facilities are not on file with the Interstate Commerce Commission.

Where rates are named from railroad docks, on both direct and dock ore, the handling charges from the rail of vessel assessed by the railroad are shown, which, added to the line-haul rate makes the aggregate charge from rail of vessel to point of interchange with private industry track at destination but does not include spotting service at such industry.

All the foregoing rates (line-haul) apply after ore has been loaded into car, to point of interchange with private industry track at destination and in no case do the rates include placing car at points of unloading on said industry track for this service, in some cases a charge of 3 and sometimes 4 cents per gross ton is named by the several carriers in addition to the line-haul rate.

"Direct ore" is ore for which shipping orders are furnished to the railroad agent prior to or at time of arrival of vessel at the dock or during the process of unloading (for any ore remaining in vessel).

"Dock ore" is ore for which no shipping orders have been furnished prior to or at time of arrival of vessel at dock or prior to the unloading of ore from vessel.

The usual carload minimum weight (except as otherwise provided) is the marked capacity of car.

The tariff authorities: Baltimore & Ohio, W. L., I. C. C., 9962; Baltimore & Ohio, I. C. C., 20127, 21518, 21515, and 21514; Pennsylvania R. R. I. C. C., F-1951 and F-1651; Wheeling & Lake Erie I. C. C., 1622; New York Central I. C. C., L. S., C-216; Bessemer & Lake Erie I. C. C., 891; Delaware, Lackawanna & Western R. R. I. C. C., 21281; Lehigh Valley R. R. I. C. C., C-7876; Buffalo, Rochester & Pittsburgh I. C. C. 8001.

VII.—THE COAL MOVEMENT

POSITION OF THE GREAT LAKES IN THE COAL MOVEMENT

The heavy eastbound movements of grain and ore on the Great Lakes have been explained in preceding chapters of this report. Westbound coal furnishes cargoes for some of the grain and ore vessels which discharge at the lower lake ports and at Duluth and Superior fills empty cars which have discharged grain. At upper lake ports the coal is stored for winter distribution which benefits the mining industry by providing a summer market for mines whose winter output is well taken care of, thus equalizing production throughout the year.

The shipment of coal to the Northwest via the Great Lakes began back as far as 1855, when 1,414 tons passed through the Soo Canal. From this small beginning the shipments have kept pace with the increasing growth of the Northwest territory and the Lake Superior ore ranges. During the season of 1928, 34,670,765 tons of coal were shipped from Lake Erie ports. This traffic constituted about 23 per cent of the total lake traffic.

The important rôle that the Great Lakes are playing in the movement of coal to the Northwest, and the economies which are available to the operator who utilizes this great system of inland waterways will be shown in the following analysis of the 1928 traffic.

LOCATION OF COAL FIELDS

The coal moving on the Great Lakes during 1928 originated in the bituminous fields of the Appalachian trough and the anthracite fields of Pennsylvania. The Appalachian field has been aptly described as the greatest storehouse in the United States, if not in the world. The northernmost extension of this reserve of coal lies in Pennsylvania just south of the New York State line which it roughly parallels. In its westerly extension into Ohio it reaches nearly to Cleveland. From this northern line the field runs in a southwesterly direction roughly parallel to the Atlantic coast down into Alabama, a distance of 800 miles. It attains its maximum width of 190 miles at Pittsburgh. It covers the eastern third of Ohio, and nearly the whole of West Virginia. At Huntington, W. Va., it begins to narrow in gradually, and at Chattanooga, Tenn., it is less than 40 miles wide, but farther on in Alabama it terminates in a roughly circular deposit 100 miles in diameter. The major regions are subdivided into many supple-

mentary districts and these latter are frequently broken up into still further subdivisions. These smaller subdivisions are usually due to variations in the quality of the coal, thickness of the seams, etc.

The bituminous coal fields of Pennsylvania are in the western part of the State, covering practically all of the area beyond Centre County, which is in the precise center of Pennsylvania.

The anthracite coal fields of Pennsylvania are confined to a very limited area in the eastern part of the State, their easterly extension being close to the New York State line. The fields are divided into four sections geologically: The northern, the middle eastern, the middle western, and the southern. There are three great trade regions: The Wyoming in the north, the Lehigh in the central portion, and the Schuylkill in the southerly portion of the territory. The Pennsylvania fields produce about 99 per cent of the anthracite coal of the United States.

The coal fields of Ohio are located in the eastern part of the State. The important districts are Northern Ohio, No. 8, Cambridge and Hocking. The most important of these is the No. 8, or Belmont district, not far from the Pittsburgh district of Pennsylvania. The Hocking Valley fields to the southeast, in Muskingum, Perry, Hocking, Athens, Vinton, and Jackson Counties are the oldest and best developed of any of the Ohio fields.

The important fields of West Virginia are located in the northern and southern parts of the State. In the northern part are the Wheeling, Fairmont, and Upper Potomac districts. The most important of these is the Fairmont, which is not only one of the largest producers in the State, but one of the oldest. In southern West Virginia the two important districts are the New River and the Pocahontas. Tributary to these are the Kanawha adjacent to the New River field and the Tug River, Thacker, and Kenova, more or less adjacent to the Pocahontas. The largest part of the tonnage of the State is produced in this section.

In Virginia, the important fields are in the Clinch Valley district, located in the southwestern part of the State. A small portion of the Pocahontas field of West Virginia is in Virginia, which together with the more or less important but isolated districts on the southern face of the Cumberland Mountains, serve to augment the State tonnage greatly.

The coal fields of Kentucky belong to two separate and distinct basins, the western field being the interior coal basin, while the eastern field is a portion of the Appalachians. The coal of the eastern part of the State finds a wide market throughout the West and Northwest, via the lake routes, while that from the western field moves all rail to western States.

The Tennessee mines are in a narrow belt extending north from the neighborhood of Chattanooga. Coal fields within this territory are the Soddy, Rockwood, Lafollette, and part of the Jellico and Southern Appalachian. The most important of these is the Jellico field.

MOVEMENT FROM MINES TO LOWER LAKE PORTS

METHODS USED IN PREPARING COAL AT MINES FOR SHIPMENT

Bituminous coal is prepared for the market at the tipple, where it is dumped from the mine cars into railroad cars for shipment to the point of consumption. The tipple is equipped with shaking screens, picking tables, conveyors, elevators, etc.

The breaker is to the anthracite industry what the coal tipple is to the bituminous, though there is little comparison between the two. The modern anthracite breaker is a massive steel and concrete structure and embodies every known device for sizing, cleaning, and handling coal. The raw coal usually enters the breaker at the top and passes down by gravity through the various stages of its treatment, the cleaned product being assembled in bins according to sizes at the bottom, ready for loading into railroad cars.

RAIL SERVICE

The territory in which lake cargo coal originates is served by numerous railroads. The larger share of the coal from all the districts moves to the ports in solid train loads, frequently of 65 to 75 cars per train. Prompt and constant attention is afforded lake cargo coal, in order to efficiently coordinate rail and vessel transfer and reduce car detention at the ports to the minimum. At the ports, the coal is set out and classified as to consignees and then held until the arrival of the vessels. When boats do not arrive in the order expected, switching is required to facilitate the loading of those that are ready for cargoes. To prevent the delay of vessels, care is exercised to have the coal ready for loading.

The following table shows the movement of lake cargo coal from mines on railroads to Lake Erie ports during 1928.

TABLE NO. 158.—*Bituminous lake cargo shipments loaded on vessel at Lake Erie ports from West Virginia, western Pennsylvania, Ohio, eastern Kentucky, Virginia, and Tennessee districts, season 1928*

[Quantities in short tons]

RAILROAD TO PORT

From mines on railroads to ports	Ashtabula	Cleveland	Conneaut	Erie	Fairport	Huron	Lorain	Sandusky	Toledo	Total	Per cent
Baltimore & Ohio R. R				1,739	1,733,272		1,761,082	387		3,496,480	10.49
Baltimore & Ohio (C. L. & W.)							271,713			271,713	00.81
Baltimore & Ohio (C. & C.)					510				5,808	6,318	00.02
Bessemer & Lake Erie R. R			1,066,642							1,066,642	03.20
Chesapeake & Ohio Ry								2,775,384	5,988,683	8,764,067	26.30
Hocking Valley Ry									25,955	25,955	00.08
Louisville & Nashville R. R								475,927	4,139,458	4,615,385	13.85
Monongahela Ry	1,465,435	118,282		15,046	6,157		64,808	7,656		1,677,384	05.03
Montour R. R	247,779	96,300	607,265	26,310						977,654	02.93
New York Central R. R. (West)	4,094									4,094	00.01
New York Central R. R. (O. C. L.)					51				1,234,873	1,234,924	03.71
Norfolk & Western Ry								3,129,643	3,531,078	6,660,721	19.99
Pennsylvania R. R. System (E. & W.)	620,938	415,480	1,031	439,279				27,680		1,504,408	04.51
Pittsburgh & Lake Erie R. R	854,237	184,643								1,038,880	03.12
Pittsburgh & West Virginia Ry. (W. S. B. R. R.)	7,027	138,155	170,006			351,641	5,199			672,028	02.02
Pittsburgh, Chartiers & Youghiogheny Ry	4,314	12,366		2,222						18,902	00.06
Virginian Ry								354,463	401,729	756,192	02.27
Wheeling & Lake Erie Ry	5,845					399,101		1,218		406,164	01.22
Western Maryland Ry	95,661	4,934			25,218					125,813	00.38
Total	3,305,330	970,160	1,844,944	484,596	1,765,208	750,742	2,102,802	6,772,358	15,327,584	33,323,724	
Per cent	09.92	02.91	05.54	01.45	05.30	02.25	06.31	20.32	46.00		100.00

Source: Ohio Bureau of Coal Statistics.

VOLUME AND DISTRIBUTION OF TRAFFIC

The coal which moved from mines to ports of loading on Lake Erie, Lake Ontario, and the St. Lawrence River during 1928 had its origin in the States of Pennsylvania, Ohio, Virginia, West Virginia, Kentucky, and Tennessee. The total movement amounted to 37,323,524 tons, of which total 35,794,940 tons were bituminous and 1,528,584 tons anthracite. Ports on Lake Erie received a total of 34,592,368 tons, consisting of 33,323,724 tons of bituminous and 1,268,644 tons of anthracite. Ports on Lake Ontario received 1,668,372 tons of bituminous and 210,279 tons of anthracite, while Ogdensburg on the St. Lawrence River received 802,844 tons of bituminous and 49,661 tons of anthracite. Of the 34,592,368 tons of coal moved to Lake Erie ports, Toledo received 15,327,584 tons; Sandusky, 6,772,358 tons; Ashtabula, 3,491,488 tons; Lorain, 2,102,802 tons; Conneaut, 1,844,944 tons; and Fairport, 1,765,208 tons, while the balance was distributed to Cleveland, Erie, Huron, and Buffalo. The total tonnage to Lake Ontario ports was divided as follows: Charlotte, 1,243,860 tons; Oswego, 59,423 tons; and Sodus Point, 575,368 tons. The St. Lawrence River received 852,505 tons, all of which moved to Ogdensburg.

The accompanying chart shows graphically the movement of coal from mining districts to ports of loading during 1928 based upon data furnished by the Ohio Bureau of Coal Statistics and the Cleveland Ore and Coal Exchange with respect to the movement of lake cargo coal to Lake Erie ports, supplemented by the data required to show the movement of the bituminous coal to Lake Ontario ports and the movement of anthracite coal from mines to Lake and St. Lawrence River ports.

From point of volume, West Virginia was the most important State that shipped lake cargo coal during 1928. The total shipments amounting to 18,802,155 tons, moved to Lake Erie ports, which exceeded the total bituminous shipments from Pennsylvania, Ohio, eastern Kentucky, and Tennessee to those ports. Toledo, Ohio, received 9,627,702 tons, or 46 per cent of the total State movement; Sandusky, 5,571,749 tons; Lorain, 1,715,250 tons; while lesser amounts went to Fairport, Ashtabula, and Cleveland. The Kanawha district, with a total of 7,161,826 tons, contributed the largest State movement to Lake Erie ports. The Pocahontas district was next with 4,832,800 tons and the Fairmount third, with 2,705,011 tons. Other districts contributing were the Moundsville, Cumberland-Piedmont, New River, and the Thacker-Kenova.

Shipments of bituminous coal from Pennsylvania amounted to 9,101,887 tons, of which 2,952,035 tons went to Ashtabula; 1,844,944 tons to Conneaut; 1,105,380 tons to Charlotte on Lake Ontario, while lesser amounts moved to Erie, Fairport, Cleveland, Lorain, Huron,

Sandusky, Toledo, Sodus Point on Lake Ontario, and Ogdensburg on the St. Lawrence River. The Pittsburgh district alone contributed 4,293,906 tons, or 47 per cent of the Pennsylvania State movement, while the Connellsville district was second with 1,395,445 tons. Shipments from the northern Pennsylvania district was 941,320 tons. The Somerset-Meyersdale district was inactive in so far as the lake cargo trade was concerned during 1928.

Kentucky ranked third in shipments with a total of 6,651,962 tons, all of which originated in the eastern Kentucky fields. Toledo and Sandusky were the principal receiving ports, with 5,519,629 tons and 1,132,333 tons, respectively. Bituminous shipments from mines located in the State of Virginia, totaled 143,830 tons. Toledo, Ohio, received 112,424 tons, while Sandusky received the remainder, or 31,406 tons.

Mines in the State of Ohio contributed 1,053,032 tons to the lake coal traffic. Of this total, 1,022,983 tons were produced in the Number Eight district, while the Hocking and northern Ohio districts shipped 25,955 and 4,094 tons, respectively. Huron was the principal port of receipt, having a total of 441,650 tons, Lorain ranked second, with 367,397 tons, and Erie third, with 94,221 tons. Lesser amounts moved to Toledo, Sandusky, Cleveland, and Ashtabula.

Shipments from the State of Tennessee amounted to 42,074 tons, of which Toledo received 41,874 tons and Sandusky 200 tons.

The total movement of anthracite coal from the anthracite region in Pennsylvania to lake ports amounted to 1,528,584 tons. Buffalo was the most important port of receipt, in point of volume, having 814,774 tons. Ashtabula ranked second with 186,158 tons, and Charlotte third, with 138,480 tons. The remainder moved to Sodus Point, Oswego, and Ogdensburg. The detailed movement of coal from each mining district to the various lower lake and St. Lawrence River ports is contained in the following tables:

TABLE NO. 159.—*Bituminous lake cargo coal shipments from mining districts to Lake Erie ports*

[Quantities in short tons]

Mining districts	Total	RECEIVING PORTS								
		Ashtabula	Cleveland	Conneaut	Erie	Fairport	Huron	Lorain	Sandusky	Toledo
Eastern Kentucky	6,651,962								1,132,333	5,519,629
Ohio:										
Hocking	25,955									25,955
Northern Ohio	4,094	4,094								
Number Eight	1,022,983	5,845	86,420		94,221		441,650	367,297	27,550	
Total	1,053,032	9,939	86,420		94,221		441,650	367,297	27,550	25,955
Pennsylvania:										
Connellsville	1,395,445	1,309,295	55,260		17,077	6,157			7,656	
Northern Pennsylvania	941,320			941,273				47		
Pittsburgh	4,293,906	1,642,740	757,177	903,671	373,298	286,256	309,092	20,208	1,464	
Total	6,630,671	2,952,035	812,437	1,844,944	390,375	292,413	309,092	20,255	9,120	
Tennessee (various mines)	42,094								200	41,874
Virginia	143,830								31,406	112,424
West Virginia:										
Cumberland-Piedmont	2,903							2,903		
Fairmont	2,705,011	343,356	71,303			676,619		1,613,733		
Kanawha	7,161,826					51			1,768,250	5,393,525
Moundsville	895,010					796,125		98,614	271	
New River	620,492								319,122	301,370
Pocahontas	4,832,800								2,739,181	2,093,619
Thacker-Kenova	1,827,921								390,462	1,437,459
Virginian Ry. (various mines)	756,192								354,463	401,729
Total	18,802,155	343,356	71,303			1,472,795		1,715,250	5,571,749	9,627,702
Grand total	33,323,724	3,305,330	970,160	1,844,944	484,596	1,765,208	750,742	2,102,802	6,772,358	15,327,584

Source: Ohio Bureau of Coal Statistics.

TABLE No. 160.—*Lake cargo bituminous coal shipments from mining districts to Lake Ontario and St. Lawrence River ports, season, 1928*

	Short tons
Pennsylvania:	
Receiving ports—	
Charlotte (Rochester)	1, 105, 380
Sodus Point	562, 992
Ogdensburg	802, 844
Total	2, 471, 216

TABLE No. 161.—*Shipments of anthracite coal from mining districts to Great Lakes and St. Lawrence River ports, season, 1928*

	Short tons
Pennsylvania:	
Receiving ports—	
Lake Erie—	
Ashtabula	186, 158
Erie	267, 712
Buffalo	814, 774
Total	[1] 1, 268, 644
Lake Ontario—	
Charlotte (Rochester)	138, 480
Sodus Point	12, 376
Oswego	59, 423
Total	210, 279
St. Lawrence River—	
Ogdensburg	49, 661
Grand total	1, 528, 584

MOVEMENT ON THE GREAT LAKES AND ST. LAWRENCE RIVER

VOLUME AND DISTRIBUTION FROM PORT TO PORT

Lake cargo coal movement.—The movement of coal on the Great Lakes and St. Lawrence River during the season of 1928 amounted to 34,742,564 tons, which comprised 33,402,121 tons of bituminous and 1,340,443 tons of anthracite. These figures do not include coal transported by car ferries to Canada. Coal for bunkering the lake steamers, known to the trade as "vessel fuel" is also excluded from these figures and the following tables. These two phases of the lake coal traffic will be discussed separately.

It will be noticed by reference to the tables that the total tonnage moving from mines to ports of loading did not in its entirety continue its movement on the Lakes. This may be accounted for in part by the retention of 76,403 tons of bituminous coal at the ports of loading.

[1] Source: Ore and Coal Exchange, Cleveland, Ohio.

This tonnage was loaded into vessels and held in port until the season 1929.

The data used in the study of this movement of coal were secured from the Cleveland Ore and Coal Exchange, and represent the tonnage consigned to destinations at the port of loading. The amounts shown as shipped to upper lake ports do not agree precisely with the amounts reported as received by these ports themselves. This discrepancy may be accounted for by reconsignment orders en route.

As it was not possible to secure accurate data at all receiving ports as to the origin of coal received during 1928, the information furnished by the Cleveland Ore and Coal Exchnage is presented in its entirety. Based upon these data, two flow charts are presented which show graphically the movement of the bituminous and anthracite coal on the Great Lakes and St. Lawrence River during 1928. From these it will be noted that practically half of the bituminous coal shipped from Lake Erie ports moved from Toledo, Ohio, and that the bulk of the anthracite coal was shipped from Buffalo, N. Y., with smaller amounts from Ashtabula, Ohio, Erie, Pa., and Sodus Point and Oswego, N. Y.

The total movement of bituminous coal from Lake Erie amounted to 33,402,121 tons, of which 29,905,200 tons moved via the Detroit and St. Clair Rivers to upper lake ports, and 3,496,921 tons flowed eastward to points on Lake Erie, Lake Ontario, and the St. Lawrence River. Charlotte (Rochester), and Sodus Point on Lake Ontario contributed 756,630 and 562,992 tons, respectively, to this movement, which was distributed to various unknown Canadian and American ports on the St. Lawrence River.

The westward movement to upper lake ports attained its maximum flow of 29,905,200 tons at the entrance to the Detroit River. Toledo led all shipping ports, contributing to the lake movement 15,327,727 tons, or 46 per cent of the total Lake Erie dumpings, while Sandusky came second with 6,763,220 tons, Ashtabula third with 3,305,329 tons, and Lorain next with 2,102,800 tons. Other ports in the order of tonnage contributed were Conneaut, Fairport, Cleveland, Huron, Erie, and Buffalo. The western movement was divided among groups of ports in the order of receipts, as follows: Lake Superior, 13,077,527 tons; Lake Michigan, 10,561,364 tons; St. Marys River ports, 1,757,460 tons; Detroit and St. Clair Rivers, 3,157,964 tons; Georgian Bay, 825,077 tons; and Lake Huron, 525,808 tons.

Ports on Lake Superior received 13,077,527 tons of the entire westward movement of bituminous coal during the season 192 8. The twin ports, Duluth, Minn., and Superior Wis., lead all ports on the Lakes, with a total of 9,337,876 tons, the Canadian ports of Port Arthur and Fort William second, with a combined total of 1,505,478 tons; ports on the Keweenaw Waterway third, with 672,015 tons;

Ashland next, with 577,080 tons; and Two Harbors, with 489,807 tons. Lesser amounts went to Marquette, Jack Fish, Canada, Munising, Washburn, L'Anse, and Ontonagon, in the order named.

The movement to Lake Michigan, amounting to 10,561,364 tons, was divided among numerous ports, among which Milwaukee led with 3,245,731 tons; Chicago and South Chicago, Ill., came second with 1,882,516 tons; and Indiana Harbor, Ind., a close third with 1,651,634 tons; Green Bay came next with 1,217,223 tons. The remainder of the Lake Michigan receipts were distributed in amounts varying from 4,077 tons to 501,523 tons among 20 other ports.

The ports on St. Marys River received a total of 1,757,460 tons, of which 1,126,226 tons, or 64 per cent, went to Sault Ste. Marie, Canada; 364,908 tons to Detour, Mich.; 134,883 tons to Sault Ste. Marie, Mich.; and 131,443 tons to Lime Island Mich.

Of the 3,157,964 tons shipped to ports on the Detroit and St. Clair Rivers, Detroit received 1,572,132 tons, or 50 per cent. Port Huron, Mich., came next with 444,556 tons; Wyandotte, Mich., third, with 426,899 tons; while the remaining 714,377 tons were distributed to various American and Canadian ports.

The Canadian ports on Georgian Bay had a combined tonnage of 825,077 tons, which was distributed as follows: Byng Inlet, 413,731 tons; Midland, 172,910 tons; Little Current, 99,093 tons; Key Harbor, 87,257 tons; and the remainder in lesser amounts to seven other ports.

The ports on Lake Huron showed total receipts of bituminous coal during 1928 amounting to 525,808 tons. Of this total, Alpena, Mich., took the lead with 255,557 tons, or about 49 per cent of the lake receipts. Calcite, Mich., was second with 133,781 tons, and Bay City third with 35,981 tons. The remainder was distributed in lesser amounts to Harbor Beach, Mich., Kincardine, Ontario, Rockport, Mich.; Goderich, Ontario; Point Edward, Ontario, St. Ignace, Mich.; and Cheboygan, Mich.

The eastward movement of bituminous coal from ports on Lake Erie amounted to 3,496,918 tons. This movement included shipments to ports on Lake Erie, Welland Canal, Lake Ontario, and the St. Lawrence River as far east as Quebec. Buffalo received 1,670,140 tons, while lesser amounts moved to ports on the Welland Canal and Lake Ontario. Incomplete data makes it impossible to show the eastbound movement in detail, particularly the movement by ports of shipment and receipt. However, the graph which follows is reasonably accurate, and is representative of the movement of this traffic.

From Charlotte (Rochester) and Sodus Point, N. Y., on Lake Ontario, a total of 1,319,622 tons of bituminous coal were shipped to points on the St. Lawrence River to which the former contributed 756,630 tons and the latter 562,992 tons. Various unknown Canadian

ports on the St. Lawrence River received 1,117,677 tons, while the remainder, or 201,945 tons, moved to American ports.

The flow chart opposite page 298, presenting the graphic movement of anthracite coal on the Great Lakes and St. Lawrence River, shows Buffalo to be the outstanding anthracite shipping port, with a total shipment of 814,744 tons. This all moved westward on Lake Erie and was distributed to upper lake ports. Other ports contributing to this movement were Erie and Ashtabula, with 267,712 tons and 186,158 tons, respectively, which made a total movement of 1,268,644 tons for the season of 1928.

The flow of this coal remained intact as it passed through the Detroit and St. Clair Rivers and Lake Huron. At the Soo, it was split two ways—644,376 tons passing through the canal and 624,268 tons going into Lake Michigan. The largest port of receipt on Lake Michigan was Milwaukee, having 440,128 tons. Chicago and South Chicago came second with 72,482 tons, and Sheboygan third, with 46,591 tons. The remainder was divided among five other ports, receiving amounts varying from 2,491 tons to 30,220 tons. Continuing with 644,376 tons, which passed through the Soo for upper lake distribution, Sault Ste. Marie, Canada, received 5,048 tons, and Sault Ste. Marie, Mich., 2,175 tons. The depleted flow, now amounting to 637,153 tons, moved into Lake Superior. The twin ports of Duluth and Superior received 570,823 tons; the former received 71,162 tons and the latter 499,661 tons. Receipts at the Canadian port of Fort William amounted to 46,001 tons; while the remainder in varying amounts was distributed among the ports on the Keweenaw Waterway, Marquette, Ashland, and Washburn.

Complete data were not available covering the movement of the anthracite coal on Lake Ontario during 1928. However, the records do disclose that the ports of Sodus Point and Oswego shipped 12,376 and 59,423 tons, respectively, which moved to various Canadian and American ports on Lake Ontario and the St. Lawrence River.

TABLE No. 162.—*Destination of bituminous cargo coal from Lake Erie ports, season 1928*

[Quantities in short tons]

To	American	Canadian
Lake Superior ports:		
Ashland, Wis.	577,080	
Duluth, Minn.	[1] 4,615,419	
Fort William, Ontario		1,474,159
Hancock, Mich.	93,826	
Houghton, Mich.	183,512	
Hubbell, Mich.	219,353	
Jackfish, Ontario		138,767
Lake Linden, Mich.	151,908	
L'Anse, Mich.	32,478	
Marquette, Mich.	186,912	
Munising, Mich.	59,194	
Ontonagon, Mich.	23,442	

[1] Includes 76,400 tons, loaded in December, 1927, and held in port; cleared in April, 1928.

TABLE No. 162.—*Destination of bituminous cargo coal from Lake Erie ports, season 1928*—Continued

[Quantities in short tons]

To	American	Canadian
Lake Superior ports—Continued		
Port Arthur, Ontario		31,319
Superior, Wis	[1] 4,722,457	
Torch Lake, Mich	23,416	
Two Harbors, Minn	439,807	
Washburn, Wis	54,478	
Total	11,433,282	1,644,245
St. Mary's River ports:		
Detour, Mich	364,908	
Lime Island, Mich	131,443	
Sault Ste. Marie, Mich	[1] 134,883	
Sault Ste. Marie, Ontario		[1] 1,126,226
Total	631,234	1,126,226
Lake Huron ports:		
Alpena, Mich	255,557	
Bay City, Mich	35,981	
Calcite, Mich	133,781	
Cheboygan, Mich	4,423	
Goderrich, Ontario		11,379
Harbor Beach, Mich	25,648	
Kincardine, Ontario		22,971
Mackinac Island, Mich	4,930	
Point Edward, Ontario		7,520
Rockport, Mich	18,199	
St. Ignace, Mich	5,419	
Total	483,938	41,870
Georgian Bay ports:		
Blind River, Ontario		806
Bruce Mines, Ontario		5,561
Bying Inlet, Ontario		413,731
Collingwood, Ontario		3,477
Gore Bay, Ontario		373
Key Harbor, Ontario		87,257
Little Current, Ontario		99,093
Midland, Ontario		172,910
Owen Sound, Ontario		19,036
Penetanguishene, Ontario		2,325
Port McNicoll, Ontario		20,508
Total		825,077
Lake Michigan ports:		
Chicago, Ill	37,655	
De Pere, Wis	12,208	
Escanaba, Mich	307,327	
Gary, Ind	501,523	
Gladstone, Mich	81,618	
Green Bay, Wis	1,217,223	
Indiana Harbor, Ind	1,651,634	
Kenosha, Wis	13,416	
Ludington, Mich	56,911	
Manistee, Mich	44,349	
Manitowoc, Wis	288,377	
Marinette, Mich	24,395	
Menominee, Mich	234,505	
Milwaukee, Wis	[1] 3,245,731	
Muskegon, Mich	16,942	
Petoskey, Mich	99,320	
Port Washington, Wis	15,977	
Racine, Wis	262,603	
Sawyer, Wis	4,077	
Sheboygan, Wis	385,985	
South Chicago, Ill	1,844,861	
Sturgeon Bay, Wis	15,726	
Traverse City, Mich	5,384	
Two Rivers, Wis	12,663	
Waukegan, Ill	180,954	
Total	10,561,364	
Detroit and St. Clair River ports:		
Amherstburg, Ontario		23,027
Courteright, Ontario		5,455
Chatham, Ontario		686
Detroit, Mich	1,572,132	
Marine City, Mich	15,232	
Ojibway, Ontario		6,485
Port Huron, Mich	444,556	
Sandwich, Ontario		[1] 322,783

[1] Includes 76,400 tons, loaded in December, 1927, and held in port; cleared in April, 1928.

TABLE NO. 162.—*Destination of bituminous cargo coal from Lake Erie ports, season 1928*—Continued

[Quantities in short tons]

To	American	Canadian
Detroit and St. Clair River ports—Continued.		
Sarnia, Ontario		104,853
St. Clair, Mich	71,364	
Walkerville, Ontario		46,864
Wallaceburg, Ontario		56,181
Windsor, Ontario		61,447
Wyandotte, Mich	426,899	
Total	2,530,183	627,781
Lake Erie ports:		
Buffalo, N. Y	1,670,140	
Erie, Pa	41,592	
Erieau, Ontario		469,224
Fairport, Ohio	56,648	
Kelly Island, Ohio	105	
Pelee Island, Ontario		524
Port Colborne, Ontario		251,434
Port Maitland, Ontario		111,525
Port Stanley, Ontario		204,136
Put in Bay, Ohio	4,173	
Toledo, Ohio	344,664	
Total	2,117,322	1,036,843
Welland Canal and Lake Ontario ports:		
Hamilton, Ontario		4,554
Odgensburg, N. Y	2,115	
Toronto, Ontario		62,786
Welland, Ontario		23,575
Total	2,115	90,915
St. Lawrence River ports:		
Montreal, Quebec		242,418
Quebec, Quebec		7,305
Total		249,723
Grand total	27,759,438	5,642,680

Source: Ore and Coal Exchange, Cleveland, Ohio.

TABLE NO. 163.—*Destination of anthracite cargo coal from Lake Erie ports, season 1928*

[Quantities in short tons]

To	American	Canadian
Lake Superior ports:		
Ashland, Wis	6,187	
Calumet, Mich	2,362	
Duluth, Minn	71,162	
Fort William, Ontario		46,001
Hancock, Mich	2,679	
Marquette, Mich	8,184	
Superior, Wis	499,661	
Washburn, Wis	917	
Total	591,152	46,001
St. Mary's River ports:		
Sault Ste. Marie, Mich	2,175	
Sault Ste. Marie, Ontario		5,048
Total	2,175	5,048
Lake Michigan ports:		
Chicago, Ill	69,962	
Green Bay, Wis	30,220	
Manitowoc, Wis	16,221	
Milwaukee, Wis	440,128	
Racine, Wis	6,049	
Sheboygan, Wis	46,591	
South Chicago, Ill	2,520	
Two Rivers, Wis	2,491	
Waukegan, Ill	10,086	
Total	624,268	
Grand total	1,217,595	51,049

Source: Ore and Coal Exchange, Cleveland, Ohio.

CAR FERRY TRAFFIC

Car ferries are used on Lake Erie, Lake Ontario, the St. Lawrence River, and Lake Michigan for carrying coal cars. The total movement during 1928 amounted to 3,476,784 tons. On Lake Erie the car ferry coal traffic totaled 740,293 tons. The movement from Ashtabula, Ohio, to Port Burwell, and Port Maitland, Ontario, amounted to 536,079 tons, which consisted of both bituminous and anthracite coal. From Conneaut, Ohio, to Rondeau and Port Stanley, Ontario, the shipments consisted of 204,214 tons of bituminous coal, and 15,766 tons of coke, which is not included in the table showing the car ferry coal movement.

From Charlotte (Rochester), N. Y., on Lake Ontario, to Cobourg, Ontario, the car ferry coal shipments consisted of 138,480 tons of anthracite, 195,600 tons of supply, and 153,150 tons of commercial bituminous.

The car ferry movement across the St. Lawrence River from Ogdensburg, N. Y., to Prescott, Ontario, amounted to 852,505 tons, which consisted of 49,661 tons of anthracite and 802,844 tons of bituminous.

The traffic across Lake Michigan amounted to 1,396,756 tons during 1928, the details of which are contained in Table No. 164.

TABLE NO. 164.—*Car ferry movement of anthracite and bituminous coal on the Great Lakes and St. Lawrence River, 1928*

[Quantities in short tons]

From—	Total	To—				
		Manistique	Menominee	Kewaunee	Manitowoc	Milwaukee
Ann Arbor R. R.: Frankfort	456,216	55,975	110,600	73,273	216,368	
Pere Marquette Ry.: Ludington	738,790			26,537	201,740	510,513
Grand Trunk Ry.: Grand Haven	201,750					201,750
Total	1,396,756	55,975	110,600	99,810	418,108	712,263

From—	Total	To—			
		Port Burwell and Port Maitland, Ontario	Port Rondeau and Port Stanley, Ontario	Cobourg, Ontario	Prescott, Ontario
Pennsylvania & Ontario Transportation Co.: Toronto, Hamilton & Buffalo Navigation Co.— Ashtabula	536,079	536,079			
Marquette & Bessemer Dock & Navigation Co.: Conneaut	204,214		204,214		
Ontario Car Ferry Co.: Charlotte (Rochester)	487,230			487,230	
Canadian Pacific Car & Passenger Transfer Co. (Ltd.): Ogdensburg	852,505				852,505
Total	2,080,028	536,079	204,214	487,230	852,505

U

arious Canadian Port

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF ANTHRACITE COAL ON THE GREAT LAKES AND ST. LAWRENCE RIVER, 1928

(Quantities in short tons)

Scale: 0 1 2 Mill Tons

SUBMITTED
M.E. Leaver
CHIEF STATISTICIAN

APPROVED:
J.J. Morrow
LT. COL. CORPS OF ENGINEERS, U.S.A.

Data by C.W.S.

Drawn by E.L.G.

LAKE BUNKER COAL

Table No. 165 shows the bituminous coal dumped at Lake Erie ports for vessel fuel during 1928. As already stated, these figures are not included in the flow chart showing the movement of bituminous coal from lower lake ports to upper lake ports.

TABLE NO. 165.—*Statement of bituminous coal loaded into vessels for fuel purposes (as dumped by docks), 1928*

[Quantities in short tons]

Port	Railroad dock	Total dumped
Toledo	Baltimore & Ohio	69,896
	Hocking Valley	174,293
	New York Central (O. C. L.)	123,990
	Big Four	13,019
Total		381,198
Sandusky	Pennsylvania R. R. Co	165,032
Huron	Wheeling & Lake Erie	31,080
Lorain	Baltimore & Ohio	127,950
Cleveland	Pennsylvania R. R. Co	84,045
	Erie Railroad	7,786
Total		415,893
Fairport	Baltimore & Ohio	90,262
Ashtabula	New York Central	117,361
	Pennsylvania R. R. Co	67,966
Total		275,589
Conneaut	Bessemer & Lake Erie	204,976
Erie	Pennsylvania R. R. Co	83,259
Buffalo	Erie Railroad	1,644
	Lehigh Valley	1,063
Total		290,942
Grand total		1,363,622

Source: Ore and Coal Exchange.

EQUIPMENT FOR UNLOADING CARS, FOR LOADING VESSELS, AND FOR STORAGE

The equipment used at lower lake ports in unloading lake cargo coal from hopper cars and loading into vessels is usually of the car-dumper type. The loaded cars are rolled down to a pit by gravity where they are connected to a cable which draws them up the incline to the platen or dumper platform where they are clamped to the cradle. It is then raised and turned over through 160°, dumping the coal into a pan. The empty car is revolved back to its normal position, loosened, and then pushed off by the next car coming up. It runs down an incline to the kickback, which sends it by gravity to the empty yard. The coal passes through a telescopic chute into the hold of the vessel.

As a certain amount of the coal carried to lake ports is loaded at the mines into box cars, an unloader for this class of car is also provided. The box-car unloaders consist of rocking cradles with centering

and locking devices for holding the cars. The loaded cars are pushed over a "hump" and run by gravity toward the cradles, just ahead of which they are stopped; the slat doors are removed, allowing part of the coal to run out into a small hopper, whence it is conveyed by an auxiliary conveyor to the main one, which runs under the rocking cradle to the tipple. The partly unloaded car is then drawn by a wire cable into the rocking cradle and after being securely clamped, is tilted longitudinally, the ends being raised and lowered alternately. When box cars are unloaded, a machine called a "reciprocating scraper" enters the car through one of the side doors and prevents the coal from running back when the car is tilted. It forces the coal to run into small chutes, through which it passes to the main conveyors. After the coal reaches the tipple it is dropped into a pan, from which it passes through a telescopic chute into the hold of the vessel.

Details of the facilities for unloading cars, for loading to vessels, and for storage at the lower lake ports are contained in Table No. 166 which follows:

TABLE No. 166.—*Coal terminals on Lake Erie*

Ports	Ashtabula, Ohio			Buffalo, N. Y.		
Name or number	New York Central R. R. Dock No. 8.	New York Central R. R. Dock No. 9.	Pennsylvania R. R. Dock No. 6.	North pier, Delaware, Lackawanna & Western R. R.	Lehigh Valley	Donner Steel Co.
Owner	New York Central R. R. Co.	New York Central R. R. Co.	Pennsylvania R. R.	do	Lehigh Valley R. R. Co.	Do.
Operator	Pickands Mather Co.	Pittsburgh Coal Co. of Ohio.	Lower Lakes Dock Co.	Delaware, Lackawanna & Western R. R. Co.	do	Do.
Exact location	East bank of Ashtabula River.	East bank of Ashtabula River.	West bank of Ashtabula River.	Fort Erie, mouth of Buff River.	Lehigh Valley slip, Canal Tifft Farm.	Buffalo River, south of Abbott Road.
Type of construction	Pile and timber, earth fill.	Concrete and timber, earth fill.	Concrete and timber, earth fill.	Reinforced concrete, steel.	Timber crib	Pitts and concrete.
Dimensions, feet	600 long, 150 wide	2,300 long, 150 wide	1,200 long, 150 wide	1,200	1,700	1,188 long, 241 wide.
Depth of water alongside (feet).	22	22	22	23	23	19.
Berthing capacity, feet	600	2,300	1,550	1,100	1,200	2,000.
Loading appliances:						
Storage pile or car to ship.					Pocket, continuous belt, through telescopic chute.	None.
Type	McMyler machine, car tipple.	McMyler machine, car tipple.	McMyler machine, car tipple.	Wellman-Seaver-Morgan, car dump.	1,000 tons net	
Capacity per hour per machine.	20 tons	2,500 tons	2,000 tons	2 Hulett cars	6 (Maine hoppers)	
Total number of machines.	1	1	1	1		
How operated	Steam	Steam and electricity	Steam and electricity	Steam		
Unloading appliances		None	None	None	None	
Car to storage pile, type.						1 Mead-Morrison 12-ton.
Capacity per hour, per machine.						2 Brown hoists, 7½-ton.
Total number machines						3.
Ground storage capacity (tons).	None	None	None	None	Lehigh Valley	300.
Name of railroad connecting.	New York Central R. R.	New York Central R. R.	Pennsylvania R. R.	Delaware, Lackawanna & Western.	7	B. R. & P. R. R. and the South Buffalo Ry.
Tracks on pier or wharf:						
Number	3 on "hill" and 3 return	1 lead and 1 return, 6 on "hill."	5	16	90	1.
Capacity, cars	60	210	60	135	1 :1	30.

TABLE No. 166.—*Coal terminals on Lake Erie*—Continued

Ports	Ashtabula			Buffalo, N. Y.		
Supporting yards				Delaware, Lackawanna & Western, East Buffalo.	1,000 feet: ¾ mile	
Number	35	3	5		3,000 :600	1.
Distance from terminal	Adjacent	Adjacent	13 miles, Austinburg	7 miles		Adjacent.
Capacity, cars	2,500	2,500	2,500	860	394 cars, 10¼ hours, 17,100 tons.	500.
Remarks: Loading or unloading records.	This machine is now out of commission. Did not operate in 1928. Handles soft coal.			45 cars, 1 hour		

Ports	Buffalo, N. Y.—Continued		Cleveland, Ohio		
Name or number	Erie R. R	Philadelphia & Reading	Erie Dock	Pennsylvania coal dock	Pennsylvania No. 24 Dock.
Owner	do	Trestle Realty Co	Erie R. R	Pennsylvania R. R	Pennsylvania R. R.
Operator	Erie R. R. Co	Philadelphia & Reading Coal & Iron	Pittsburgh Coal Co. of Ohio	Pittsburgh Coal Co	Pittsburgh Coal Co.
Exact location	Blackwell Canal	Erie Basin	Erie Docks	On lake front, south of union station.	On lake front, south of union station.
Type of construction	Wood	Timber	Timber, earth fill	Timber, earth fill	Timber, earth fill.
Dimensions, feet	1,800 feet property, 1,056 feet pockets.	1,804.5 feet dock and trestle, 693 feet dock.	850 feet (a wharf)	700 long, 140 wide	850 long, 250 wide.
Depth of water alongside, feet.	23	18	21	22	24.
Berthing capacity, feet	1,500	693 berth	850	400	Any lake vessel, bow first.
Loading appliances:					
Type	Wooden trestle	Chutes and pockets	Wellman-Seaver-Morgan car tipple.	McMyler Interstate car tipple.	Wellman-Seaver-Morgan machine car tipple.
Capacity per hour per machine.	1,000 net tons	1,000 net tons	25 cars	20 cars	40 cars.
Total number of machines.	88 pockets, use 25 pockets for coal and 3 pockets for salt.	80 chutes and pockets	1	1	1.
How operated			Steam		Steam.
Ground storage capacity, tons.			None		None.
Name of railroad connecting.	Erie	New York Central	Erie	Pennsylvania	Pennsylvania.
Tracks on pier or wharf:					
Number	110 cars, 4 approaches hoisting; 250 cars, 7 storage tracks; 100 cars, 5 tracks (emptys).	5 tracks	2, 1 lead and 1 return; 3 tracks on "hill."	2, 1 lead and 1 return; 3 tracks on "hill."	

Capacity, cars		100	110	35	50.
Supporting yards:					
Number	1 East Buffalo	Pennsylvania and Reading yard 1.	1	3	Bedford yards.
Distance from terminal	3 miles	Adjacent to terminal	12 miles	Adjacent	12 miles.
Capacity, cars	4,900	125	1,200		800.
Remarks: Loading or unloading records.		Not used, 1928–29	Handle soft coal. Large railroad yards located at Randall.	Not operated	Handle soft coal. Have loaded 10,000 tons in 5 hours.

Ports	Conneaut, Ohio	Erie, Pa.		Fairport, Ohio	Huron, Ohio
Name or number	Pittsburgh & Conneaut Dock No. 3.	Pennsylvania R. R. East Dock.	Pennsylvania R. R. Coal Dock.	Valley Camp Coal Dock	Wheeling, Lake Erie Ore & Coal Dock.
Owner	Bessemer & Lake Erie R. R.	Pennsylvania R. R.	Pennsylvania R. R.	Baltimore & Ohio R. R.	Wheeling, Lake Erie Dock.
Operator	Pittsburgh & Conneaut Dock Co.	Central Stevedoring Co.	Erie Dock Co.	Valley Camp Coal Co.	Cleveland Stevedore Co.
Exact location	At mouth of Conneaut River.	Foot of Parade Street	West end of bay	East bank of Grand River	Mouth of Huron River, east side.
Type of construction	Outer half concrete, inner piling.	Pile and timber, fill	Pile and timber, fill	Pile and timber, earth fill	Timber, earth fill.
Dimensions, feet	1,125 long, 130 wide	1,200–70	130–1,240	900–150	800–150.
Depth of water alongside, feet.	22	23	25	230	23.
Berthing capacity, feet	1,125	1,200	1,240	1,000	1,600.
Loading appliances: (Storage pile or car to ship.)					
Type	McMyler machine, car tipple.	McMyler machine, car tipple.	McMyler machine, car tipple.	McMyler, interstate machine, car tipple.	McMyler, interstate, 100 tons capacity, car tipple.
Capacity per hour per machine.	35 cars	35 cars	1,500 tons	1,200 tons	30 cars.
Total number of machines.	1	1	1	1	1.
How operated	Electric		None	None	None.
Unloading appliances	None	None	None	None	None.
Name of railroad connecting.	Bessemer & Lake Erie R. R.	Pennsylvania R. R.	Pennsylvania R. R.	Baltimore & Ohio R. R.	Wheeling & Lake Erie R. R.
Tracks on pier or wharves:					
Number	8	4 on "hill," 1 to machine	7 on "hill," 1 to machine	3	4.
Capacity, cars	180	85	170	35	40.
Supporting yards		Pennsylvania R. R. yards	3 yards	2	2.
Number	Numerous	Adjacent	3 miles	1,410 miles	At shore end of pier.
Distance from terminal	15–20 miles distant	Numerous	1,500	1,500	A 1,200 car yard is located ½ mile distant.
Capacity, cars	1,200–1,500				
Remarks: Loading or unloading records.	Have dumped 645 cars in 20 hours.	Not used	Handle soft coal only	Handle soft coal	

TABLE No. 166.—*Coal terminals on Lake Erie*—Continued

Ports	Lorain, Ohio	Sandusky, Ohio	Toledo, Ohio	Toledo, Ohio	Toledo, Ohio
Name or number	Baltimore & Ohio R. R	Lower Lake Dock Co. Nos. 1 and 2.	Baltimore & Ohio R. R. coal dock.	Hocking Valley Ry. coal dock.	New York Central coal dock (Ohio Central Lines).
Owner	do	Pennsylvania R. R. Co	Baltimore & Ohio R. R. Co	Hocking Valley Ry. Co	New York Central R. R. Co.
Operator	do	Lower Lake Dock Co	do	do	Do.
Exact location	On west bank of Black River, 1 mile from mouth.	West end, foot of King Street.	East side of Maumee River above Fassett Street Bridge.	On east side of Maumee River about 500 feet above Ash Street Bridge.	East side Maumee River between Cherry and Fassett Street Bridges.
Type of construction	Concrete and timber, earth fill.	No. 1 timber fill, concrete end, No. 2 concrete, earth fill.	Concrete bulkhead	Solid fill pier with concrete bulkheads.	Timber bulkhead.
Dimensions, feet	950 long (wharf)	No. 1, 1,000 by 50; No. 2, 1,000 by 500.	750	Face 400, upper and lower sides 1,000 each.	1,700.
Depth of water alongside, feet.	22	23 in slip, 17 in mooring basin.	21	23 in slips or sides	22.
Berthing capacity—feet	1,200	3,000	750	2,000	1,700.
Loading appliances:					
Storage pile or car to ship, type.	McMyler, interstate, car tipple.	No. 1 machine a McMyler, interstate, 50 tons capacity; No. 2 machine, a Wellman-Seaver-Morgan Co., 100 tons capacity, car tipples.	Car dumper, 1 Wellman-Seaver-Morgan Co.	Car dumper, Brown hoist type.	Car dumper, McMyler.
Capacity per hour per machine.	35 cars	No. 1, 40 cars; No. 2, 35 cars	47 cars	45 cars or about 2,500 tons per hour.	20 cars.
Total number of machines.	1	2	1	2	1.
How operated	Steam	Steam and electricity			
Unloading appliances:					
Car to storage pile, type	None	None	No facilities	No facilities	No facilities.
Ground storage capacity, (tons).	do	None	None	None	None.
Name of railroad connecting.	Baltimore & Ohio R. R.	Pennsylvania R. R. Co	Baltimore & Ohio R. R	Hocking Valley Ry	New York Central R. R.
Tracks on pier or wharf:					
Number	Two, 1 lead and 1 return track.	1 lead and 1 return track on each pier.	16	5	6.
Capacity, cars	Return track, 44 cars, 1 "hill."	1 on pier at one time. One "hill" for each machine.	240	160	68.
Supporting yards:					
Number	1	1	3	1	1.
Distance from terminal	1 mile	2 miles	1 mile	¼ mile	¼ mile.
Capacity, cars	A 2,500-car yard is located about 1½ miles distant (42 tracks).		1,500 cars	1,800	300.
Remarks					

TABLE NO. 166.—*Coal terminals on Niagara River*

Port	Buffalo
Name or number	Wickwire Spencer Steel Co.
Owner	Do.
Operator	Do.
Exact location	Rattlesnake Island, Niagara River.
Type construction	Concrete on piles; slag back fill.
Dimensions in feet	1,045 long, 62.10 wide.
Depth water alongside in feet	24.
Berthing capacity in feet	1,045.
Loading appliances	None.
Unloading appliances:	
Car to storage pile, type	2.
Capacity per hour per machine	250 tons.
Unloading appliances—Continued	
Total number machines	2.
How operated	Electricity.
Ground storage capacity in tons	None.
Name of railroad connecting	New York Central.
Tracks on pier or wharf:	
Number	1.
Capacity in cars	23.
Supporting yards:	
Number	1.
Distance from terminal	½ mile.
Capacity in cars	Not known.

TABLE No. 166.—*Principal coal terminals on Lake Ontario*

Ports	Port of Rochester, N. Y.	Oswego, N. Y.		Great Sodus, N. Y.	Fair Haven, N. Y.
Name or number	Charlotte Dock Co	Delaware, Lackawanna & Western R. R. coal trestle.	New York, Ontario & Western R. R. coal trestle.	Pennsylvania R. R. coal dock.	Lehigh Valley R. R. coal dock.
Owner	do	Delaware, Lackawanna & Western R. R. Co.	New York, Ontario & Western R. R. Co.	Pennsylvania R. R. Co	Lehigh Valley R. R. Co.
Operator	do	Delaware, Lackawanna & Western R. R. Coal Co.	do	do	Do.
Exact location	On Genessee River, left bank (west side), 3 miles inside entrance.	Foot of West Third Street	Foot of East Second Street	West side of Great Sodus Bay 1¾ miles inside of entrance.	East side of Little Sodus Bay ¾ mile inside of entrance.
Type of construction	Steel trestle	Timber	Timber	Timber crib	Timber crib.
Dimensions, feet	937 long	480 long, 40 wide	480 long, 45 wide	400 long, 38 wide	1,500 long.
Depth of water alongside, feet.	20	16, low water	19½, low water	22	18.
Berthing capacity, feet	830	1,000	600	875	1,500.
Loading applainces: Storage pile or car to ship, type.	Cars placed by locomotives and coal loaded thence into vessels. Gantry dump.	Car to ship	Trestle and pockets	McMyler interstate	Coal unloaded into trestle pockets, thence into vessels.
Ground storage capacity, tons.	None	None	None	None	None.
Name of railroad connecting.	Buffalo, Rochester & Pittsburgh R. R. Co.	Delaware, Lackawanna & Western R. R. Co.	New York, Ontario & Western R. R. Co. and New York Central R. R.	Pennsylvania R. R. Co	Lehigh Valley R. R. Co.
Tracks on pier or wharf, number	2	3	3 on trestle	2	2.
Supporting yards:					
Number	1	Delaware, Lackawanna & Western R. R. Co. yards.	New York, Ontario & Western R. R. yards.	1	1.
Distance from terminal	8 miles	Adjacent	3 miles	Adjacent	At terminal.
Capacity, cars	375	50	400	452	150.
Remarks		Cars are pulled up on trestle by means of steam-operated car puller. Cars are spotted over pockets and hoppers opened, the coal falling into pockets. A chute extends from each pocket to vessel hold.	Cars are shunted on trestle by locomotive, spotted over pockets, and hoppers opened. For vessel loading, a chute extends from each pocket.		None.

TABLE No. 166.—*Principal United States Coal terminals on the St. Lawrence River*

Ports	Ogdensburg, N. Y.		Morristown, N. Y.
Name or number	Geo. Hall Corporation coal dock	One	W. H. Comstock.
Owner	Geo. Hall Corporation	Madden Coal Corporation	Do.
Operator	do	do	Do.
Exact location	Foot of Tate Street	1 mile west of Ogdensburg	Morristown, N. Y.
Type of construction	Pile and timber fill	Link belt conveyor system	
Dimensions, feet	3,500 foot tramway		150 by 14.
Depth of water alongside, feet	18	20	20.
Berthing capacity, feet	1,200	350	
Loading appliances:			
Storage pile or car to ship type	3 hoists	Belt conveyor	
Capacity per hour per machine	150 tons	350 tons	
Total number of machines		1	
How operated	Steam	Electric	
Unloading appliances:			
Car to storage pile, type	2 Mead Morrison towers	Brown hoist	
Capacity per hour per machine	3,000 tons, 3 hours		
Total number of machines	2		
How operated	Steam		
Ground storage capacity, tons	150,000	About 5,000	
Name of railroad connecting	Rutland R. R	New York Central	Private.
Tracks on pier or wharf:			
Number	1	None	
Capacity, cars	20		
Supporting yards:			
Number	Rutland R. R. yards	None	
Distance from terminal	Adjacent		
Capacity, cars	450		
Remarks	Handle soft coal received from Charlotte. During winter coal is loaded from storage pile to cars by McMyler traveling cranes.		Reception of own supply of coal only.

VOLUME AND DISTRIBUTION OF COAL TO CANADIAN PROVINCES

The coal resources of Canada lie in the maritime Provinces and the three western Provinces. The output from these Provinces is not sufficient to meet the yearly needs, and Central Canada adjacent to the Great Lakes is almost entirely dependent for its supply on that shipped from the United States. The coal is shipped across the Lakes or by rail through the gateways at Buffalo and Detroit. Since 1922, when the great strike tied up United States mines and some of those in Canada, quantities of coal have been imported from Great Britain.

During 1928 the exportations of coal from the United States to Canada amounted to 17,036,047 tons, which compared with the records for the preceding year shows a decrease of 1,278,201 tons. The exportations of coal from Great Britain to Canada decreased from 928,544 tons in 1927 to 670,612 tons in 1928.

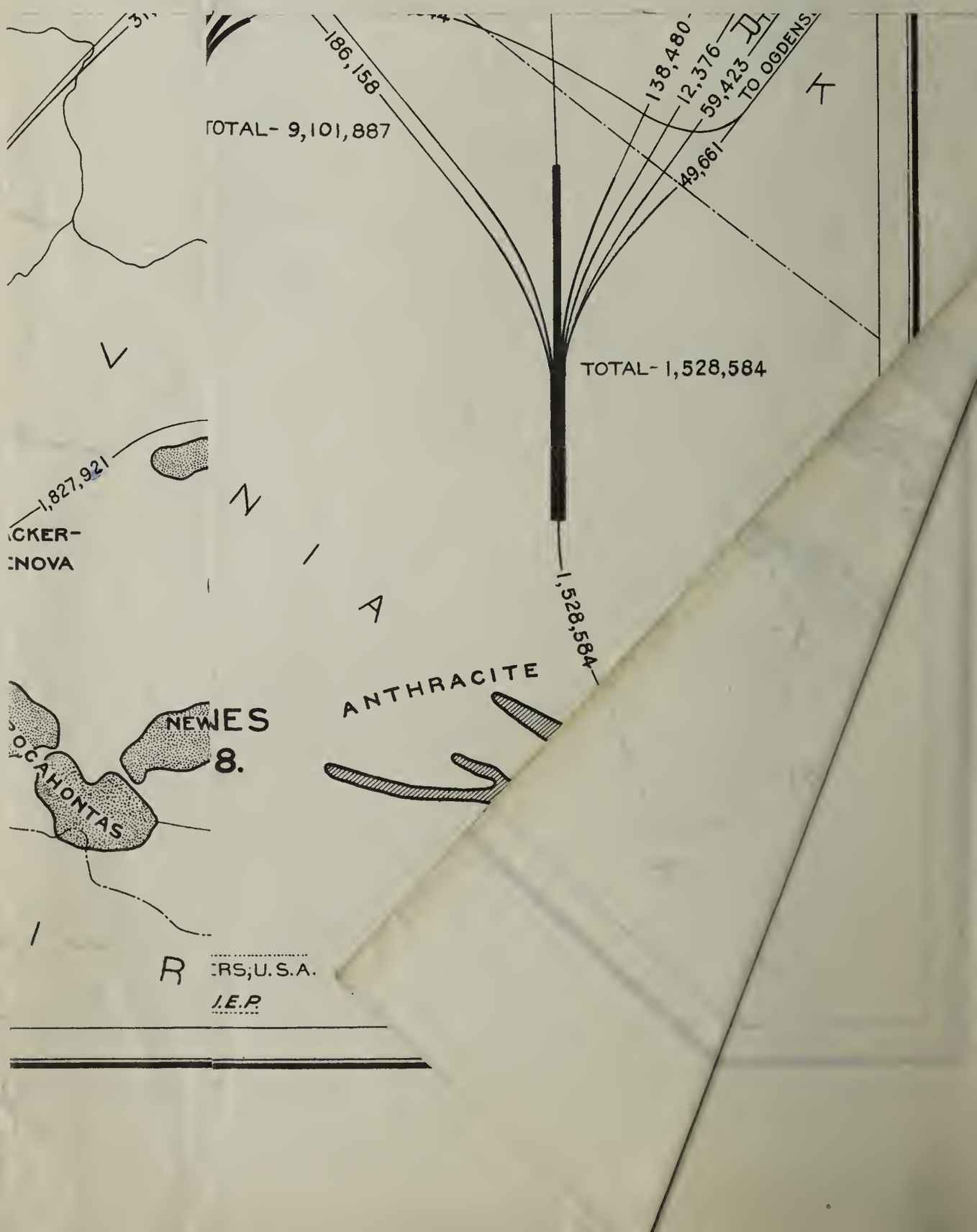
In 1927 imports of anthracite from the United States totaled 3,265,411 tons; from Great Britain, 788,235 tons; and from other countries, 9,973 tons, making a total of 4,063,619 tons. During 1928 anthracite imports included 3,203,231 tons from the United States, 526,467 tons from Great Britain, and 7,635 tons from Belgium, British South Africa, the Netherlands, and Russia. Imports of 6,204 tons of anthracite coal from Russia in December, 1928, marked the first movement of coal from that country to Canada.

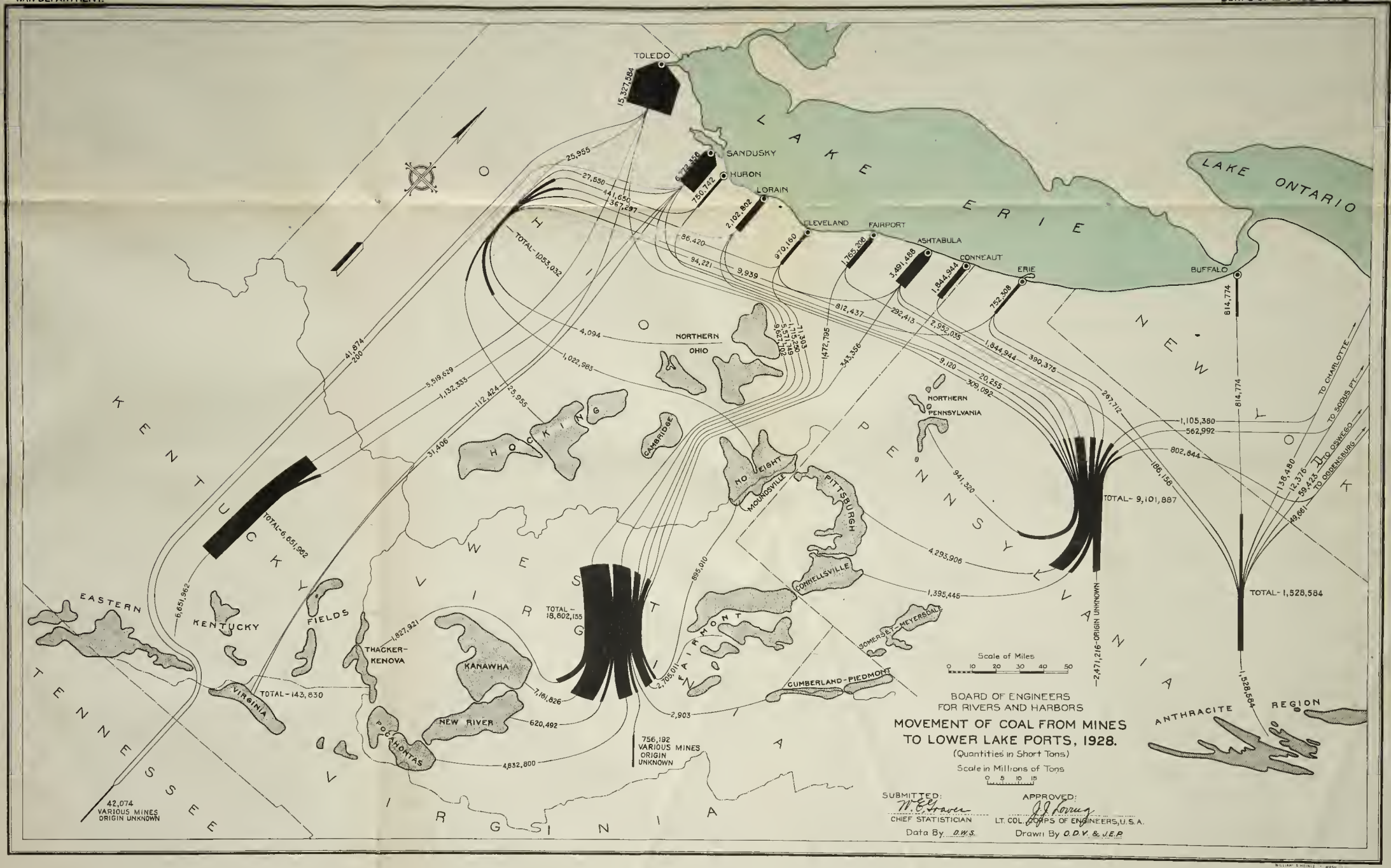
Canada's coal output of 17,564,293 tons in 1928 set up a new high record, exceeding the 1927 mark of 17,426,861 tons by nearly 1 per cent.

The accompanying chart shows the coal available for consumption in Canada by Provinces during 1928. The circle within each Province is divided according to the amount it receives of the Canadian production and of imports from the United States, Great Britain, and other foreign countries.

The imports of coal from the United States during 1928 went principally to the Provinces of Central Ontario, Quebec, and Manitoba. Central Ontario received 12,802,659 tons, while Quebec and Manitoba received 2,205,762 tons and 1,840,572 tons, respectively. Central Ontario was the largest consuming Province during this year, having available for consumption 12,867,311 tons.

Table No. 167 shows the distribution of coal imported from the United States, Great Britain, and other foreign countries to Canadian Provinces, as well as the output of Canadian coal and its distribution.


186,158
TOTAL- 9,101,887
138,480
12,376
59,423
TO OGDENS
49,661
TOTAL- 1,528,584
1,827,921
1,528,584
ANTHRACITE
NEW
8.
POCAHONTAS
RS;U.S.A.
I.E.P.



BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF COAL FROM MINES TO LOWER LAKE PORTS, 1928.

(Quantities in Short Tons)

SUBMITTED: M.E. Leeper
CHIEF STATISTICIAN

APPROVED: J.J. Lowry
LT. COL. CORPS OF ENGINEERS, U.S.A.

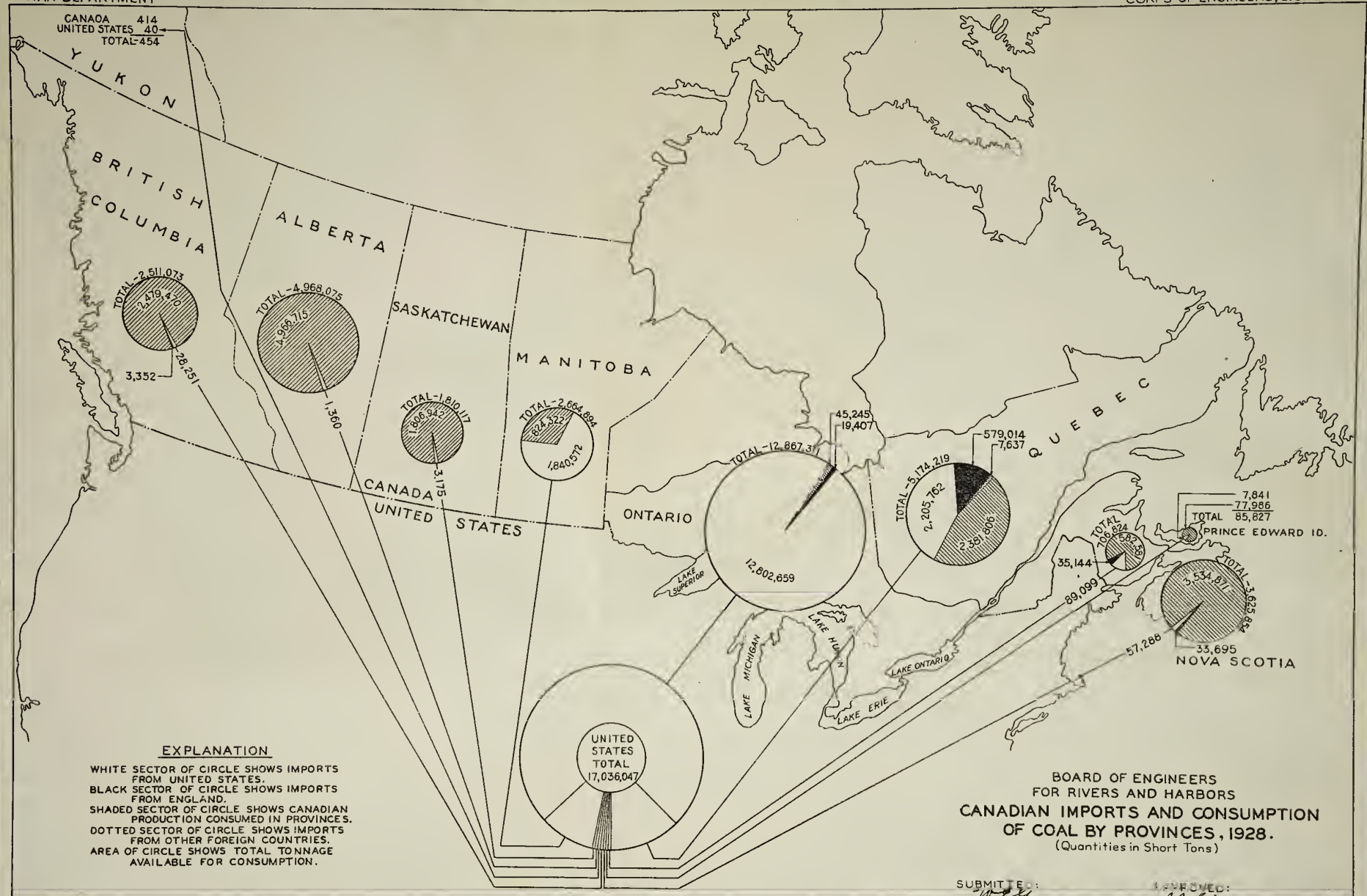
Data By O.W.S.

Drawn By O.D.V. & J.E.P.

WILLIAM S. HEINZ - WASH.

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.



EXPLANATION

WHITE SECTOR OF CIRCLE SHOWS IMPORTS FROM UNITED STATES.
BLACK SECTOR OF CIRCLE SHOWS IMPORTS FROM ENGLAND.
SHADED SECTOR OF CIRCLE SHOWS CANADIAN PRODUCTION CONSUMED IN PROVINCES.
DOTTED SECTOR OF CIRCLE SHOWS IMPORTS FROM OTHER FOREIGN COUNTRIES.
AREA OF CIRCLE SHOWS TOTAL TONNAGE AVAILABLE FOR CONSUMPTION.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

CANADIAN IMPORTS AND CONSUMPTION OF COAL BY PROVINCES, 1928.

(Quantities in Short Tons)

SUBMITTED:
W. B. Graves
CHIEF STATISTICIAN
Data By D.W.S.

APPROVED:
J. J. Gorin
LT. COL. CORPS OF ENGINEERS, U.S.A.
Drawn By J.E.P.

103996—30. (Face p. 308.)

TABLE No. 167.—*Coal available for consumption in Canada, by Provinces, 1928*

[Quantities in short tons]

Province	Canadian coal				Imported from United States	Imported from Great Britain	Imported from other countries	Coal available for consumption
	Output	Received from other Provinces	Shipped to other Provinces	Exported				
Prince Edward Island:								
Anthracite					3,765			3,765
Bituminous		78,062		76	4,076			82,062
Total		78,062		76	7,841			85,827
Nova Scotia:								
Anthracite					29,815	29,314		59,129
Bituminous	6,743,504		2,864,254	344,379	27,473	4,381		3,566,725
Total	6,743,504		2,864,254	344,379	57,288	33,695		3,625,854
New Brunswick:								
Anthracite					39,615	34,061		73,676
Bituminous	207,738	400,684	101	25,740	49,484	1,083		633,148
Total	207,738	400,684	101	25,740	89,099	35,144		706,824
Quebec:								
Anthracite					902,155	441,465	[1] 7,635	1,351,255
Bituminous		2,382,246		440	1,303,607	137,549	[2] 2	3,822,964
Total		2,382,246		440	2,205,762	579,014	7,637	5,174,219
Central Ontario:								
Anthracite					2,159,657	19,407		2,179,064
Bituminous		33		4	10,643,002			10,643,031
Subbituminous		13,061						13,061
Lignite		32,187		32				32,155
Total		45,281		36	12,802,659	19,407		12,867,311
Manitoba and head of Lakes:								
Anthracite					67,624			67,624
Bituminous		47,340		479	1,772,948			1,819,809
Subbituminous		96,250						96,250
Lignite		684,820		3,609				681,211
Total		828,410		4,088	1,840,572			2,664,894
Saskatchewan:								
Anthracite					579			579
Bituminous		139,454		52	2,536			141,938
Subbituminous		85,915						85,915
Lignite	471,713	1,341,217	223,551	7,754	60			1,581,685
Total	471,713	1,566,586	223,551	7,806	3,175			1,810,117
Alberta:								
Anthracite								
Bituminous	3,215,494	56,097	220,840	241	1,360			3,051,870
Subbituminous	740,496		234,003					506,493
Lignite	3,380,340		1,970,026	602				1,409,712
Total	7,336,330	56,097	2,424,869	843	1,360			4,968,075
British Columbia:								
Anthracite					21	2,220		2,241
Bituminous	2,804,594	93,348	112,069	458,093	17,510	1,132		2,346,422
Subbituminous		38,777						38,777
Lignite		135,353		22,440	10,720			123,633
Total	2,804,594	267,478	112,069	480,533	28,251	3,352		2,511,073
Yukon: Bituminous	414				40			454
Canada:								
Anthracite					3,203,231	526,467	7,635	3,737,333
Bituminous	12,971,744	3,197,264	3,197,264	829,504	13,822,036	144,145	2	26,108,423
Subbituminous	740,496	234,003	234,003					740,496
Lignite	3,852,053	2,193,577	2,193,577	34,437	10,780			3,828,396
Total	17,564,293	5,624,844	5,624,844	863,941	17,036,047	670,612	7,637	34,414,648

[1] Includes 6,204 tons from Russia, 1,102 tons from the Netherlands, 328 tons from British South Africa, and 1 ton from Belgium.
[2] Imported from Newfoundland.

Source: Canada, Dominion Bureau of Statistics.

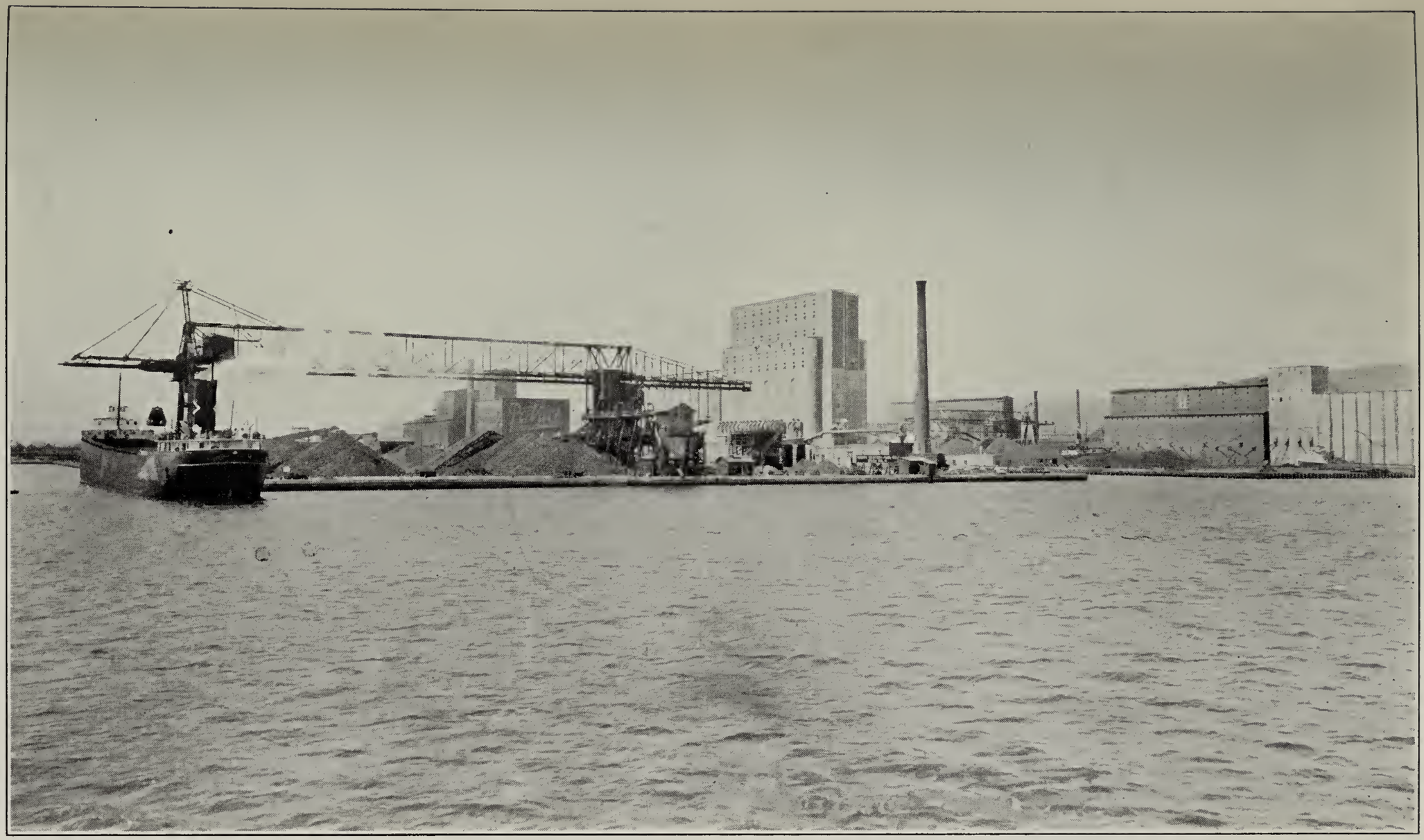
MOVEMENT OF COAL FROM UPPER LAKE PORTS TO DESTINATION

The northwestern market for lake coal includes Wisconsin, Minnesota, Iowa, Michigan, the Dakotas, Montana, Nebraska, Arkansas, and some points even further west, as well as a large strip of Canadian territory along the adjacent border. This territory requires coal for railroads, homes, iron and copper mines, and growing manufacturing industries. Excluding the iron and copper mining regions, there is not an extensive demand for steam coals in this section, but the territory covered is large and more or less settled, and the rigorous winters create a high per capita consumption of domestic grades. After severe storms, which often delay and at times entirely paralyze the rail traffic for days, the docks are called upon to meet a sudden and extraordinary demand for coal from all quarters. If the coal supply for the northwest were to come by rail from the points of production as required, considerable difficulty would be experienced in supplying, from current production, the concentrated demands that occur here during the periods when rail transportation, due to climatic conditions, is at its worst. A railway storage depot, such as the docks afford, has the flexibility necessary to meet emergencies. As the business has increased, the docks have been called upon more and more to stock coal for the consumers. This is particularly true in normal times in the case of railroad companies whose coal occupies a considerable portion of the dock storage space. They stock their coal early, but only take it from the docks as they require it.

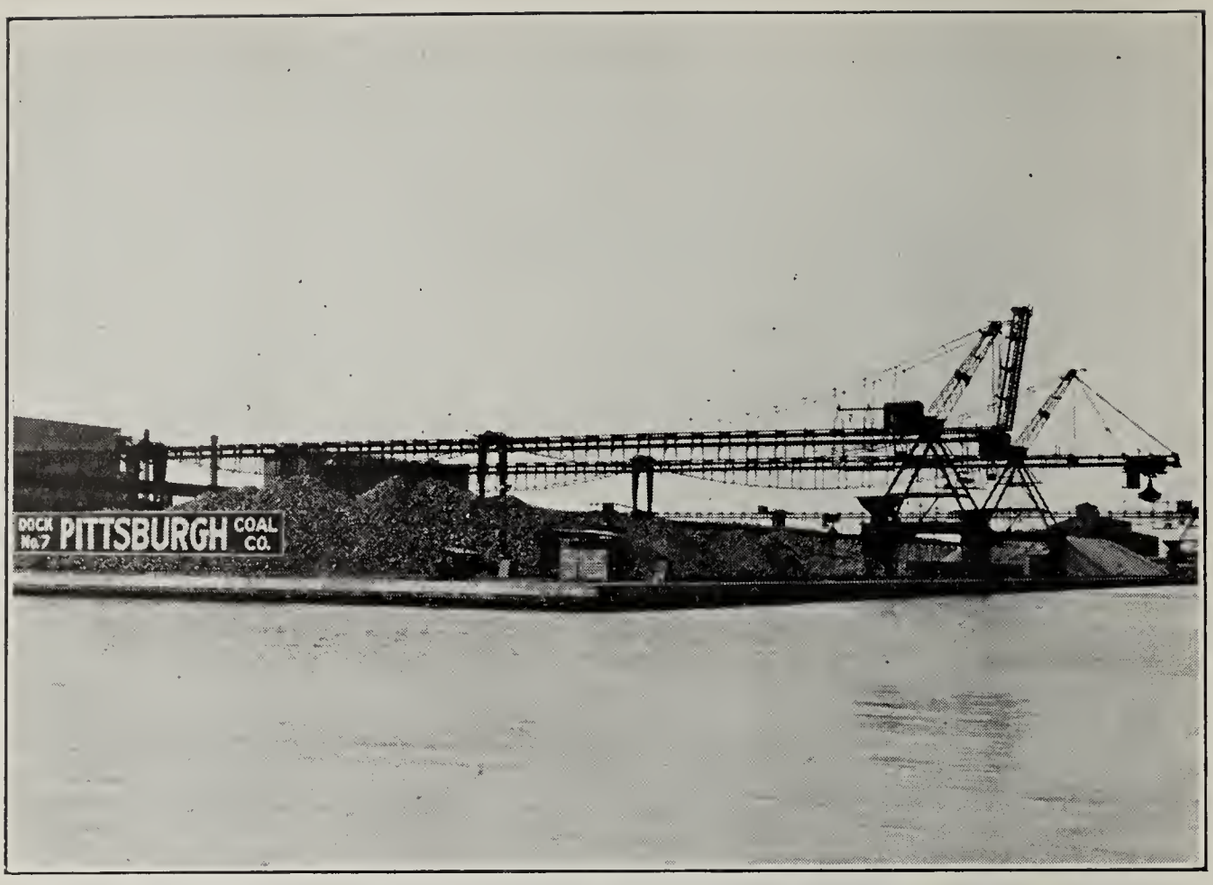
It has been impossible to secure complete data showing the rail movement of coal from upper lake ports to the northwest territory for the year 1928, consequently this information has been omitted from this chapter.

METHODS OF UNLOADING COAL, DESCRIPTION OF FACILITIES AND STORAGE AREAS

The development of coal-handling machinery at upper lake ports has been an interesting phase of the lake coal traffic. Since 1871, when the first cargo of commercial coal brought to Duluth-Superior Harbor was unloaded by means of wheelbarrows, the development of coal unloading machinery has passed through various stages to the present modern steel bridge. In 1871 coal was reshipped direct by rail as there were no handling facilities and no provisions for stocking it at the head of the Lakes. A dock for handling coal was equipped in 1877 by the Northwestern Fuel Co. In 1878 a special type of derrick utilizing a small steam hoisting engine marked a development in the discharge of coal cargoes. The year 1901 wit-



NORTH WESTERN FUEL COMPANY DOCK NO. 4, SHOWING ALSO CAPITOL ELEVATOR AND ELEVATOR H AND ANNEX, DULUTH-SUPERIOR HARBOR



DOCK NO. 7 OF THE PITTSBURGH COAL CO., DULUTH-SUPERIOR HARBOR

COAL CAR TIPPLE AND WHARF OF THE PITTSBURGH COAL CO., CLEVELAND, OHIO

PHILADELPHIA & READING COAL DOCK AND NORTHERN COAL DOCK, DULUTH-SUPERIOR HARBOR

ssed the construction of the first electric coal handling plant ever
stalled. In the late eighties the shovel bucket was developed and
ed for reclaiming coal for reloading. A few years later clamshell
ckets began to supersede the old-style tubs for unloading. These
re suitable for both unloading and reclaiming. They have been
rfected of late years and are built of different designs for various
rposes.

Most of the upper lake docks are equipped with efficient mechani-
l means for handling coal, many being most modern. In the
ost modern types of electrically operated man-trolley coal bridge,
e unloading, stocking, repreparing, reclaiming, and loading opera-
ons are accomplished by a single unit.

A typical coal-handling dock is that of the Northwestern Fuel Co.,
Superior. This is located on Superior Bay at the foot of Hill
venue, and has a total area of 45.2 acres, with a planked storage
rea of 35 acres. It has a storage capacity of 700,000 tons of bitu-
inous and 300,000 tons of anthracite coal and is electrically operated
roughout, with steam-driven generating equipment maintained for
mergency use. The equipment for handling coal comprises two
Heyl and Patterson towers with 3-ton clamshell buckets; 4 Brown
owers with 2-ton clamshell buckets; 3 Brown transfer cars; 4 triple-
pan Brown bridges, each with two "man-trolleys," one carrying
-ton stocking buckets and the other carrying 4-ton shovel buckets;
ne Heyl and Patterson bridge with one "man-trolley" carrying a
2-ton clamshell bucket; one screening tower of 600 tons capacity
er hour with an Ottumwa steel belt box-car loader. In addition
here are two rows of timber bins 1,000 feet long, each with a capacity
f 3,000 tons, with loading screens; 3 anthracite storage buildings;
ne anthracite screening and loading plant; 3 Ottumwa portable
ox-car loaders; one tilting box-car loader at the anthracite loading
plant; one 150-ton track scale and three 100-ton track scales.

The following table contains detailed information concerning the
principal coal docks at upper lake ports.

TABLE NO. 168.—*Coal terminals at upper lake ports*

Ports	Ashland, Wis.			Washburn, Wis.	Duluth, Minn.
Name or number	Clarkson Coal & Dock Co.	Pittsburgh & Ashland Coal & Dock Co.	C. Reiss Coal Co	North Western Fuel Co	Berwind No. 2.
Owner	do	do	do	do	Berwind Fuel Co.
Operator	do	do	do	do	Do.
Exact location	Foot of Whittlesey Avenue	Foot of Seventh Avenue West.	Foot of Fourteenth Avenue East and immediately west of inner end of Chicago & North Western Ry. ore dock No. 1.	Washburn, Wis	Minnesota side upper St. Louis Bay and north of Northern Pacific Ry. crossing Grassy Point Bridge.
Type of construction	Round and sheet piles, partly filled.	Round and sheet piles, sand fill.	Round piles and timber cribs, sand fill.	Pile and timber, sand fill	Concrete—entire storage space of concrete.
Dimensions, feet	205 by 1,250	323 by 1,000	793 by 2,833	400 by 600	525 by 1,800.
Depth of water alongside, feet.	15 to 22	19 to 23	20	21	19.5 to 21.
Berthing capacity, feet	900	1,000	793	600	1,800.
Loading appliances:					
Storage pile to car, type.	Use 3 rigs for loading, unloading, and stocking.	Locomotive crane with 1½ ton clam. Use same bridge for loading, unloading, and stocking.	Use same bridges	Use runways, loader to buckets by hand thence to runways by rope or horse.	Unloading appliances also used for loading.
Capacity per hour per machine.	100 tons	250 tons	400 tons digging, 290 tons average throughout the day.	400 tons for plant	500 tons.
Total number of machines.	3	1		12	3.
Unloading applicances:					
Ship to car or storage pile, type.	3 McMyler whirlies, 2-ton claims; cable-car system for stocking and bins for shipping.	Movable Mead-Morrison bridge hoist with 5-ton clam for digging and 2-ton for clean-up.	1 Heyl-Patterson bridge, with 6-ton clam and 4-ton with 24-foot spread.	Fixed runways with 2-ton clams.	Link-belt bridges with 7½ ton clams.
Capacity per hour per machine.	85 tons	300 tons	290 tons	400 tons	500 tons.
Total number of machines.	3	1	2	12	3.
How operated	Steam	Electric	Electric	Electric (line shaft drive)	Electric.
Ground storage, capacity, tons.	100,000 soft; 7,500 hard (open)	40,000 hard; 200,000 soft	100,000 soft; 27,000 hard	100,000	1,000,000 soft.
Name of railroad connecting.	Chicago & North Western Ry.; Minneapolis, St. Paul & Sault Ste. Marie Ry.; Chicago, St. Paul, & Omaha Ry.; and Northern Pacific Ry.	Chicago, St. Paul & Omaha Ry.; Minneapolis, St. Paul & Sault Ste. Marie Ry.	Chicago & North Western Ry.	Minneapolis, St. Paul & Sault Ste. Marie Ry.	Minneapolis, St. Paul & Sault Ste. Marie Ry.; Northern Pacific Ry.

Tracks on pier or wharf:					
Number	1	4 loading, 1 hard coal	2 soft and 1 hard coal track	3	6—3 at front and 3 at back of dock.
Capacity, cars	25	100	28 for soft; 6 for hard	40	160.
Supporting yards:					
Number	Use connecting railroad	None	Use trackage of Chicago & North Western Ry.	None, use trackage of connecting railroad.	1.
Distance from terminal					Adjacent.
Capacity, cars					80; 2 tracks.
Remarks	Screening plants on each rig 1 box-car loader—100 tons capacity per hour. Storage pockets have capacity of 400 tons and one other pocket with capacity of 60 tons.	Hard-coal shed 100 by 100 with capacity of 20,000 tons. Has drag chain conveyor to house, coal is elevated and shot out on conveyor to screening plant, thence to cars. Screening plant is on back of crane. A Manieere movable box-car loader has a capacity of 100 tons per hour.	1 steam operated box-car loader movable with capacity of 150 tons per hour. Hard-coal storage shed 173 by 266 feet, capacity 27,000 tons. Screening plant on bridge.	Coal loader into storage bins and thence by gravity to cars.	All coal is reshipped. Each bridge is equipped with a box-car loader which loads as fast as bridge supplies coal. A link-belt screening tower is located in the rear, on separate tracks. A link-belt gantry crane also operates on these tracks and is used on small-screen sizes. These two appliances span the three rail tracks in the rear of dock.

Port	Duluth, Minn.—Continued				
Name or number	Carnegie No. 2	Clarkson Coal & Dock Co	Ford Motor Co. dock operations.	Inland Coal & Dock Co	North Western Fuel Co. No. 4.
Owner	Carnegie Dock & Fuel Co	do	do	do	North Western Fuel Co.
Operator	do	do	do	do	Do.
Exact location	St. Louis River west of Fifteenth Avenue West.	East side Rice's Point between Ash and Birch Avenues.	Minnesota side St. Louis Bay at Thirty-seventh Avenue West.	On St. Louis River at foot of Fiftieth Avenue West and along southerly side Lesure Street on Grassy Point.	Rice's Point.
Type of construction	Pile with concrete superstructure, sand fill.	Timber cribs, sheet piles and sand fill; with one-half concrete.	Timber crib, sheet piles, sand fill, concrete.	Timber cribs with concrete dock front, sand filled.	Timber crib, concrete cap sand filled.
Dimensions, feet	400 by 2,000	630 by 2,029	367 by 2,373	450 by 2,854	400 by 1,600.
Depth of water alongside, feet.	20 to 30 M. L. W	20 to 23	20 to 24	21 to 25	26.
Berthing capacity, feet	2,490	2,029	2,373	2,854	1,600
Loading appliances:					
Storage pile or car to ship, type.	Mead-Morrison bridge hoists; 2 for soft coal with 7-ton clam shells; 2 for hard coal, 3½-ton clams.	1 Mead-Morrison bridge with 6-ton clam; 2 Watson bridge hoists with 3-ton clams.	Brown hoist bridge (movable).	Heyl-Patterson bridges with 6-ton clams.	Use same equipment for loading, unloading, and stocking.
Capacity per hour per machine.	2 soft coal, 500 tons; 2 hard coal, 200 tons.	600 tons for all apparatus	590 tons	500 tons reloading	
Total number of machines.	4	3	1	2, electrically operated	

TABLE No. 168.—*Coal terminals at upper lake ports*—Continued

Port	Duluth, Minn.—Continued				
Unloading appliances:					
Ship to car or storage pile, type.	Use same equipment for loading, unloading, and restocking.	1 Mead-Morrison bridge with 6-ton clam; 1 Robertson-Shafer hoist with 3-ton clam.	Brown hoist bridge (movable) with 12-ton clam for digging and 6½-ton for cleaning up.	Heyl-Patterson bridges with 7-ton clams.	Movable Brown hoist with 10-ton clam.
Capacity per hour per machine.	Soft 600 tons; hard 400 tons	250 tons	650 tons digging; 450 tons cleaning up.	350 tons	600 tons.
Total number of machines.	4	2	1	2	1.
How operated	Electric	Electric	Electric	Electric	Electric.
Ground storage capacity, tons.	Hard coal 150,000; soft coal 600,000.	Hard coal 30,000; soft coal 450,000.	Soft coal 590,000	856,000 tons	Hard coal 250,000; soft coal 100,000.
Name of railroad connecting.	Northern Pacific Ry	Soo Line; Great Northern; Chicago, St. Paul, Minneapolis & Omaha; Northern Pacific Rys.	Northern Pacific Ry	Northern Pacific Ry	Northern Pacific and Soo Line.
Tracks on pier or wharf:					
Number	6	6	3	4	3.
Capacity, cars	200	200	195	270	100.
Supporting yards:					
Number	None, use trackage of connecting railroad.	None, use trackage of connecting railroad.	None, use trackage of connecting railroad.	None, use yard of connecting railway.	None, use trackage of connecting railroads.
Remarks	Frame hard-coal shed; local trade, reshipped. Additional equipment: 4 box-car loaders, with capacity of 200 tons per hour each. Detached, movable screening plant.	Same apparatus is used for unloading and reshipping. About 80 per cent of coal is shipped in box cars. Rescreening apparatus on all cranes.	Shaker screening plant has 1 elevator to take care of screening into cars on tracks or into storage. 2 tilting machines equipped with conveyors; 2 box-car loaders.	Additional equipment: 2 box-car loaders with capacity of 5 cars or 200 tons per hour each. 2 Heyl-Patterson screening plants are located at front of pier and attached to bridges. Vessels can be bunkered at the rate of 300 tons per hour.	Additional equipment: Screening plant; 2 stationary box-car loaders with capacity of 150 tons per hour each.

Port	Duluth, Minn.—Continued		
Name or number	Coal Dock No. 7	St. Louis Bay Dock Co	Zenith Furnace Co.
Owner	Pittsburgh Coal Co	St. Louis Bay Dock Co. (formerly D., M. & N. Ry.).	Do.
Operator	do	do	Do.
Exact location	East side Rice's Point, 900 feet northwest from Ash Avenue.	Minnesota side St. Louis Bay, along harbor west of Twenty-ninth Avenue West.	On St. Louis River, foot of Fifty-fifth Avenue West.

Type of construction	Timber cribs, concrete superstructure, sand filled.	Timber cribs, sheet pile, sand fill, with concrete superstructure.	Pile with concrete superstructure; sand and slag filled.
Dimensions, feet	882 by 1,750	604 by 1,830	475 by 2,059.
Depth of water alongside, feet.	19 to 21	21 to 25	20 to 22.
Berthing capacity, feet	1,750	600	2,000.
Loading appliances:			
Storage pile or car to ship, type.	3 double span bridges; 2 single span bridges	Transfer bridges	2 brown hoists with single span bridges and 10-ton clam shell buckets.
Capacity per hour per machine.	325 tons	200 tons	500 tons.
Total number of machines.	5	4	2 electrically operated.
Unloading appliances:			
Ship to car or storage pile, type.	Brown hoist bridge, double span with 6½-ton clams.	Mead-Morrison hoist with three 2-ton buckets and two 4-ton buckets with cable car system.	Same as loading.
Capacity per hour per machine.	325 tons	250 tons	500 tons.
Total number of machines.	3	5	2.
How operated	Electric	Electric	Electric.
Ground storage capacity, tons.	Hard coal 80,000; soft coal 920,000	600,000	650,000.
Name of railroad connecting	Northern Pacific; Chicago, St. Paul; Minneapolis & Omaha; Minneapolis, St. Paul & Sault Ste. Marie; Great Northern Rys.	Duluth, Missabe & Northern Ry	Northern Pacific Ry.
Tracks on pier or wharf:			
Number	9	2	7.
Capacity, cars	300	150	125.
Supporting yards:			
Number	None, use trackage of connecting railroads	None, use trackage of Duluth, Missabe & Northern Ry.	None, use yard of connecting railway.
Distance from terminal		Adjacent	
Remarks	The three double-span bridges are used for both unloading and reshipping. The two single-span bridges located on back of dock are equipped with soft coal-screening plants. One 2-ton locomotive crane with 60-foot reach is used as utility loading for retail wagon pockets and tug-fuel pockets as well as local use about plant. There is covered storage for 35,000 tons hard coal which is included in the 80,000 tons storage capacity of plant.	There are 114 4-ton cable cars operated by endless wire rope on trestle. The fuel pockets have a capacity of 12,000 tons and are equipped with chutes on 12-foot centers with screens under hoppers for loading into cars. Lump coal and screening can be handled at the same time.	This plant also has two box-car loaders with capacity of four cars per hour each and two screening plants independent of the bridges. The pocket system of reloading at this plant consists of bins 2,000 feet long equipped with belt conveyors which take screening to screening plants located at the end and midway of the loading pockets.

TABLE No. 168.—*Coal terminals at upper lake ports*—Continued

Port	Superior, Wis.				
Name or number	Coal Dock No. 1	Carnegie Dock & Fuel Co., Coal Dock No. 1.	Coal Dock No. 1	Coal Dock No. 2	Coal Dock No. 5.
Owner	Berwind Coal Co	Great Northern Ry	Great Northern Railway Co.	North Western Fuel Co	Pittsburgh Coal Co. of Wisconsin.
Operator	do	Carnegie Dock & Fuel Co.	Great Lakes Coal & Dock Co.	do	Do.
Exact location	Wisconsin side of St. Louis Bay on south channel, about 3,200 feet west of Northern Pacific-Wisconsin drawbridge.	Wisconsin side St. Louis Bay on south channel, about 2,110 feet west of Northern Pacific-Wisconsin drawbridge.	Wisconsin side St. Louis Bay on south channel, 2,600 feet west of Northern Pacific-Wisconsin drawbridge.	Wisconsin side St. Louis Bay on south channel, about 2,100 feet west of Northern Pacific-Wisconsin drawbridge.	On Allouez Bay east of Great Northern ore docks.
Type of construction	Timber crib, sheet pile, sand fill.	Timber cribs, sheet piles; concrete superstructure, sand filled.	Timber cribs, sheet piles, and sand fill, east 800 feet concrete.	Timber cribs and sheet piles, sand fill.	Timber crib and top with sand fill.
Dimensions, feet	588.5 by 2,600	320 by 2,525	550 by 2,500	410 by 2,000	475 by 3,400.
Depth of water alongside, feet.	20 to 24	20 to 22	20 to 22	20 to 22	19 to 21.
Berthing capacity, feet	2,600	2,525	2,500	2,000	3,400.
Loading appliances:					
Storage pile or car to ship, type.	Dodge Co. bridge hoists with 5-ton clams.	Heyl & Patterson bridges with 6-ton clams; 6-ton clean-up clams.	4 box-car loaders; 2 locomotive cranes with 1-ton clams.	Use same equipment for loading, unloading, and stocking.	Brown hoist single-span bridges.
Capacity per hour per machine.	Three 400 tons	300 tons each	200 tons		325 tons.
Total number of machines.	4	2	4		2.
Unloading appliances:					
Ship to car or storage pile, type.	Dodge Co. bridge hoists with 5-ton clams.	Heyl & Patterson bridges with 6-ton clams; 6-ton clean-up clams.	1 Mead-Morrison movable bridge with 2-ton clam; 1 Mead-Morrison hoist with 6-ton clam, 4½-ton clean-up; 1 Mead-Morrison hoist with 10-ton clam, 6-ton clean-up.	Heyl-Patterson bridges with 6-ton clams.	Brown hoist single-span bridges.
Capacity per hour per machine.	Three 400 tons	250 tons	Two 300 10-ton clams; 400 first digging.	333 tons each	325 tons.
Total number of machines.	4	2	3	3	2.
How operated	Electric	Electric	Electric	Electric	Electric.
Ground storage capacity, tons.	700,000 soft coal	500,000	100,000 hard coal; 600,000 soft coal.	550,000 tons	200,000 hard coal; 800,000 soft coal.

Name of railroad connecting.	Lake Superior Terminal & Transfer Ry. and Great Northern Ry.	Great Northern Ry		Lake Superior Terminal & Transfer Ry. Co.	Duluth, South Shore & Atlantic; Northern Pacific; Chicago, St. Paul, Minneapolis & Omaha; Minneapolis, St. Paul & Sault Ste. Marie; Great Northern Rys.
Tracks on pier or wharf:					
Number	5	2	5	4	5.
Capacity, cars	100	125	245	160	400.
Supporting yards:					
Number	None; use trackage of connecting railroad.	None; use trackage of connecting railroad.	None; use trackage of connecting railroad.	1	1.
Distance from terminal				Adjacent	At terminal.
Capacity, cars				150	400.
Remarks	Same apparatus used for unloading and reshipping. Hopper part of bridge on the front of dock and screening tower at the back. 3 Ottumwa box-car loaders. 2 Manieere box-car loaders. 1 electric crane with capacity of 200 tons per hour is used to handle bricketts to screening plant. 2 movable screening units have capacity of 200 and 120 tons per hour.	Use same equipment for loading, unloading, and stocking. Two box-car loaders with 175-ton capacity per hour each. Screening plant attached to bridge.	Additional equipment: Screening plant on two bridges; back legs and portable plant in center of dock. Maximum loading 5,700 tons, 20 hours; normal loading, 2,800 in 10 hours.	Additional equipment: 2 screening plants, one front of dock and one on the rear. 2 portable box-car loaders, capacity 175 tons per hour each.	Each bridge has a screening plant at the rear. There is one 2-ton locomotive crane with 60-foot reach for reloading and 3 track scales. A covered shed for hard coal has a capacity of 100,000 tons which is included in above storage.

Port	Superior, Wis.—Continued				
Name or number	M. A. Hanna Dock Co	Lehigh Valley Coal Sales Co.	Northern Coal & Dock Co.	North Western Dock No. 1	Philadelphia & Reading Coal Co.
Owner	do	do	do	North Western Fuel Co	Do.
Operator	do	do	do	do	Do.
Exact location	Superior Bay, foot of Buck Avenue, and southeast of northern coal dock.	West side Tower Bay slip and foot of Banks Avenue.	Superior Bay, Connor's Point, southeast and adjoining Philadelphia & Reading coal dock.	Superior Bay, foot of Hill Avenue, and southeast of Hanna coal dock.	On St. Louis Bay, Connor's Point, about 5,700 feet southeasterly from Duluth-Superior bridge.
Type of construction	Timber cribs and sheet piles, sand fill.	Timber cribs and round and sheet piles, sand-filled concrete top.	Cribs and sheet piles, sand fill. Concrete dock front 794 feet.	Timber cribs and sand fill	Timber cribs and sand fill.
Dimensions, feet	1,150 by 1,075	800 by 600, 12 acres	917 by 1,164	1,190 by 1,245	545 by 1,164.
Depth of water alongside, feet.	20 to 23	19 to 21	20 to 23	20 to 23	20 to 23.
Berthing capacity, feet	1,075	800	794	Two slips, 1,200 by 1,290, combined length 2,490.	1,100.

TABLE No. 168.—*Coal terminals at upper lake ports*—Continued

Port	Superior, Wis.—Continued				
Loading appliances: Storage pile to car, type.	Mead-Morrison bridges with 2-ton clams.	Use same equipment for loading, unloading, and stocking.	Mead-Morrison reclaiming bridges with two 2-ton grab buckets, and one 2-ton scraper or clean-up bucket.	Three transfer cars and 4 bridges, 4 shovel trolleys with 4-ton drag.	Two movable and 2 fixed Heyl-Patterson bridges with 6-ton clams.
Capacity per hour per machine.	300 tons		150 tons	120 tons	250 tons.
Total number of machines.	3		3	4	4.
Unloading appliances: Ship to car or storage pile, type.	Mead-Morrison traveling hoists, with 2-ton clam.	Steel towers, Link Belt Co., 4-ton clams (2 digging and 2 clean-up).	Two transverse steel bridges and Mead automatic cars and cable; 3 Mead-Morrison traveling unloading towers with 2-ton clams.	One Heyl-Patterson movable single span bridge with 12-ton clam; 4 Brown hoists, 2-ton clams; 2 Heyl-Patterson hoists with 3-ton clams.	Two movable and 2 fixed Heyl-Patterson bridges with 6-ton clams.
Capacity per hour per machine.	150 tons	400 tons each	200 tons	H. & P. bridge 600 tons; H. & P. hoists 250 tons; Brown hoists 150 tons.	250 tons.
Total number of machines.		2	3	7	4.
How operated	Steam	Electricity	Electricity	Electricity	Electricity.
Ground storage capacity, tons.	50,000 hard coal; 400,000 soft coal.	135,000 total (2 steel hard-coal storage sheds, 55,000 tons capacity each).	70,000 hard coal; 500,000 soft coal.	300,000 hard coal; 700,000 soft coal.	160,000 hard coal; 240,000 soft coal.
Name of railroad connecting.	Lake Superior Terminal & Transfer Ry. Co.	Lake Superior Terminal & Transfer Ry. Co.	Lake Superior Terminal & Transfer Ry. Co.	Lake Superior Terminal & Transfer Co. ship over the Soo Line, Omaha, Northern Pacific, and Great Northern.	Chicago, St. Paul, Minneapolis & Omaha Ry.
Tracks on pier or wharf: Number	6	3	5	18	4.
Capacity, cars	110	70	124	100	72.
Supporting yards: Number	1		None, use yard of connecting railroad.	1	None, use trackage of connecting railroad.
Distance from terminal	Adjoining			Adjoining	
Capacity, cars	20			100	
Remarks		Only handle hard coal. One tilter box car loader, capacity 300 tons per hour; 1 screening plant in rear of dock, capacity 300 tons per hour. The screening		Additional equipment: There are 3 transfer cars for the 4 Brown hoist towers and the 4 Brown hoist bridges; 3 movable box-car loaders; 4 station-	Use same rigs for unloading and reshipping. Can fuel from storage pile to ships at same rated capacity per hour. Bridge rigs have 2 screening apparatus on rear

		house has a capacity of 17,050 tons screened coal; conveyor travels under storage buildings to screening plant. Maximum unloading, 917 tons per hour.

				ary box-car loaders; car pulier, operating 3,200 feet; car puller (drum type); the 12-ton clam is used for digging and an 8-ton clam with 24-foot spread for cleaning up. After close of navigation season the twenty-one 7-ton stocking tubs are taken off and four 1-ton clams used for cleaning up.	for soft coal. A rocker loader for loading hard coal into box cars, tips car endwise, and each end filled; when car is brought to level position it is filled to capacity. A 40-ton car can be loaded in 15 minutes if screens can furnish coal. Covered storage for hard coal, 350–300 by 455 feet. A 36-inch conveyor belt operates from storage shed to screens and a 42-inch belt from screens to cars.

Port	Superior, Wis.—Continued		Port	Superior, Wis.—Continued	
Name or number	Coal dock No. 2	The C. Reiss Coal Co.	Unloading appliances—Continued.		
Owner	Northern Pacific Ry	Do.	Total number of machines.	3	2.
Operator	Great Lakes Coal and Dock Co.	Do.	How operated	Steam	Electric.
Exact location	Superior Bay, foot of Thompson Avenue.	Wisconsin side St. Louis Bay on south channel, about 3,860 feet west of Northern Pacific-Wisconsin drawbridge.	Ground storage capacity, tons.	150,000	650,000 soft coal, 75,000 hard coal.
Type of construction	Timber cribs and sand fill	Timber cribs and sheet piles with sand fill; front and bridge foundations concrete.	Name of railroad connecting.	Northern Pacific Ry	Lake Superior Terminal & Transfer Ry. Co., Great Northern Ry., and Minneapolis, St. Paul & Sault Ste. Marie Ry.
Dimensions, feet	320 by 1,050	460 by 2,600.	Tracks on pier or wharf:		
Depth of water alongside, feet.	20 to 22	22 to 24.	Number	2	Seven—4 for soft and 3 in center for hard coal.
Berthing capacity, feet	1,050	2,600.	Capacity, cars	40	191.
Loading appliances:			Supporting yards:		
Storage pile or car to ship, type.	Wellman - Seaver - Morgan bridges with 2-ton clams.	Use same equipment for loading, unloading, and stocking.	Number	None, use trackage of connecting railway.	None, use trackage of connecting railway.
Capacity per hour per machine.	200 tons		Remarks	Same equipment used for loading and unloading. Additional equipment: 2 stationary box-car loaders, electrically operated, capacity, 200 tons per hour each; 2 screening plants with box-car loader, electrically operated, maximum loading in 30 hours, 10,000 tons.	Hard coal storage shed with capacity of 30,000 tons. Additional equipment: 5 box-car loaders with capacity of 5,500-6,500 tons per 10-hour day; screening plants attached to both bridges.
Total number of machines.	3				
Unloading appliances:					
Ship to car or storage pile, type.	Wellman - Seaver - Morgan bridges with 3-ton clams; 1½ ton clean-up clams.	Two Heyl-Patterson bridge hoists, 7-ton clams; 5½ ton clean-up clams.			
Capacity per hour per machine.	300 tons	500 tons.			

TABLE No. 168.—*Coal terminals at upper lake ports*—Continued

Ports	Marquette, Mich.	Two Harbors, Minn.
Name or number	Marquette Dock Co	Duluth & Iron Range R. R. Co.
Owner	do	Do.
Operator	do	Do.
Exact location	Foot of Washington Street	On east side of bay.
Type of construction	Reinforced concrete	Timber piles and cribs with concrete beam and slab superstructure.
Dimensions, feet	1,000 by 300	549 by 34.
Depth of water alongside, feet	21	22.
Berthing capacity, feet	1,000	549.
Loading appliances:		
Storage pile to car, type	Mead-Morrison bridge 6-ton clam; locomotive crane, 1½-ton clam	Mead-Morrison electric steel bridge, 275-foot span; with 2-ton drag.
Capacity per hour per machine	Bridge 300 tons, crane 50 tons	80 maximum.
Total number of machines	2	1.
Unloading appliances:		
Ship to car or storage pile, type	1 Mead-Morrison bridge, 6-ton clam	3 Mead-Morrison towers with 2-ton clams; cable railway system.
Capacity per hour per machine	500 tons	300 tons.
Total number of machines	1	3.
How operated	Steam	Steam.
Ground storage capacity, tons	150,000 tons	150,000 soft.
Name of railroad connecting	Duluth, South Shore & Atlantic & Lake Superior & Ishpeming Ry	Duluth & Iron Range R. R. Co.
Tracks on pier or wharf:		
Number	3	None.
Capacity, cars	100	
Supporting yards:		
Number	D. S. S. & A., 4 tracks; L. S. & I., 3 tracks	1.
Capacity, cars	300	150 gondola cars.
Remarks		20 wooden pockets with 4,000 tons' capacity, independent screening plant with two 1,000-ton concrete pockets. Receiving dock for water-borne coal.

Port	Keweenaw Waterway, Mich.		
Name or number	City of Hancock	Houghton County Street Ry. Co	The Peoples Fuel Co.
Owner	City of Hancock Water Works	do	Do.
Operator	do	do	Do.
Exact location	Hancock, Mich., foot of Park Avenue	Hancock, Mich., west of Houghton-Hancock Bridge.	Hancock, Mich., just west of Houghton-Hancock Bridge.
Type of construction	Pile	Pile	Pile.
Dimensions, feet	150		350.
Depth of water alongside, feet	20 to 21	23 to 24	18 to 20.
Berthing capacity, feet	150	150	312.
Loading appliances:			
Storage pile or car to ship, type	None		Pick-up engine with 1-ton clam.
Capacity per hour per machine			30 tons.
Total number of machines			1.
Unloading appliances:			
Ship to car or storage pile, type	¼-ton buckets	¼-ton buckets	Haas hoist with 1-ton clam and cable system.
Capacity per machine per hour			80 tons.
Total number of machines			1.
How operated	Loaded by hand and hoisted by steam	Loaded by hand and hoisted by steam	Steam.
Ground storage capacity, tons	5,000 soft coal		8,000 hard coal shed; 50,000 to 60,000 soft coal.
Name of railroad connecting	None	None	Mineral Range R. R.
Tracks on pier or wharf:			
Number			1.
Capacity, cars			6.
Supporting yards:			
Number			None.
Remarks	One cargo of coal is received a year for use of pumping station.	Not in use	

TABLE No. 168.—*Coal terminals at upper lake ports*—Continued

Port	Keweenaw Waterway, Mich.—Continued			
Name or number	Portage Coal & Dock Co	Quincy Mining Co	Copper Range R. R. Co	Michael Messner, jr.
Owner	do	do	do	Do.
Operator	do	do	do	Do.
Exact location	Hancock, Mich., east of Houghton-Hancock Bridge.	Hancock, Mich., east of Houghton-Hancock Bridge.	Houghton, Mich	Houghton, Mich.
Type of construction	Pile	Pile	Pile	Pile.
Dimensions, feet	400	300 by 150	950	
Depth of water alongside, feet	18 to 20	20 to 23	20 to 22	15 to 17.
Berthing capacity, feet	400	550	950	180.
Loading appliances:				
Storage pile or car to ship, type.	McMyler unloaders with ¾-ton clams.	None	Use 1 hoist to fill pocket, 5,500-ton capacity. Gravity to cars, 2 tracks.	
Capacity per hour per machine.	100 tons from pockets			
Total number of machines	3			
Unloading appliances:				
Ship to car or storage pile, type.	Mead-Morrison hoists with 1-ton clams and cable system.	¼-ton coal buckets	Mead-Morrison clamshell hoists, one 1¼ and two 1½ ton clams.	Coal buckets, ¼-ton.
Capacity per hour per machine.	225 tons	50 tons	1,300 tons per day each	
Total number of machines	2		3	
How operated	Steam	Loaded by hand and hoisted by steam.	Steam	Loaded by hand and hoisted by steam.
Ground storage capacity—tons	12,000 hard coal shed; 75,000 soft coal.	16,000 soft coal	15,000 tons	
Name of railroad connecting	Mineral Range R. R	Mineral Range R. R. and Copper Range R. R.	Copper Range R. R	Duluth, South Shore & Atlantic Ry. Co.
Tracks on pier or wharf:				
Number	1		2	
Capacity, cars	20		40	
Supporting yards:				
Number	None	None		
Capacity, cars			40	
Remarks		Coal consumed at local plant	Handle coal for industries served by railroad.	

Port	Keweenaw Waterway, Mich.—Continued		
Name or number	M. Van Orden Co	No. 2 coal dock	Stamp mill.
Owner	do	Calumet & Hecla Consolidated Copper Co.	Quincy Mining Co.
Operator	do	do	Do.
Exact location	Houghton, Mich., west of bridge	Torch Lake, Mich	Torch Lake, Mich.
Type of construction	Pile and timber; concrete top, sand filled	Pile and timber	Pile and timber.
Dimensions, feet	831	1,400	500.
Depth of water alongside, feet	16 to 22	20	20 to 30.
Berthing capacity, feet	900	2,400	600.
Loading appliances:			
Storage pile or car to ship, type	5 pockets, 500 tons each	Use same equipment for loading, unloading, and stocking.	Use hoists and trolley with drag line pick-up to towers or to bin at back for local consumption.
Capacity per hour per machine	200 tons	200 tons	40 tons.
Total number of machines	Same machine	1	
Unloading appliances:			
Ship to car or storage pile, type	Single-span bridge, clam hoists, 2½-ton clams.	Mead-Morrison single-span movable bridge, with 9-ton clam for digging and 5-ton for clean-up.	Mead-Morrison hoists; Hunt car system from hoist to shed.
Capacity per hour per machine	150 tons	400 tons	200 tons each maximum.
Total number of machines	2		3 with 1¼-ton clams.
How operated	Electric	Electric	Steam.
Ground storage capacity, tons	50,000 bituminous; 15,000 anthracite	500,000 soft coal	75,000 in shed.
Name of railroad connecting	Copper Range R. R. Co	Own railroad	Copper Range R. R. Co.
Tracks on pier or wharf:			
Number	None	2	1.
Capacity, cars		100	20 narrow-gage cars or 12–14 standard gage.
Supporting yards:			
Number		1	1.
Distance from terminal	Tracks behind bridges	Adjacent	Adjacent.
Capacity, cars	16 cars at a loading	100	6.
Remarks		Hopper at each end of bridge with about 3-car storage capacity. Coal sold to employees and to own mines.	Handle only soft coal.

TABLE No. 168.—*Coal terminals on St. Marys River, Mich.*

Ports	Detour, Mich.	Lime Island, Mich	Sault Ste. Marie, Mich.		
Name or number	Valley Camp Coal Co	Lime Island Dock	Hewitt-Bell Coal Co. Dock	Kemp Bros. Coal Co. Dock	Pittsburgh Coal Co. Dock.
Owner	Mrs. T. H. Watson	Pittsburgh Coal Co. of Michigan.	Hewitt-Bell Coal Co., Austin J. Lipsett, proprietor.	Kemp Bros. Coal Co	Pittsburgh Coal Co. of Michigan.
Operator	W. C. Wylie & Co	do	Austin J. Lipsett	do	Do.
Exact location	Detour, Mich	On St. Marys River 35 miles below Sault Ste. Marie, Mich.	Between Government Fort Brady pier and Great Lakes Towing Co. Dock.	¼ mile east of Government locks.	Algonquin, Sault Ste. Marie, Mich.
Type of construction	Pile and crib dock	Piling	Piling and plank	Crib dock	Slab and piling.
Dimensions, feet	Approximately 150 by 300, with extension for snubbing vessel lines.	800 long	Dock 156 by 26	1,000	600.
Depth of water alongside	22 feet	22 feet	22 feet	21 feet	19 feet.
Berthing capacity, feet	600	750	225	1,000	450.
Loading appliances:					
Storage pile to car or ship, type.	Excelsior derrick, 6 pockets; tramway on angle 45 degrees.	Whirleys	McMyler whirley	McMyler	Whirleys.
Capacity per hour per machine.	600 tons	100 tons	60 tons	300 tons	100 tons.
Number of machines	1	2	1	4	2.
Unloading appliances:					
Ship to car or storage pile, type.	Use self-unloaders	Whirleys	McMyler whirley	McMyler	Whirleys.
Capacity per hour per machine.		100 tons	60 tons	300 tons	100 tons.
Total number of machines.		2	1	4	2.
How operated		Steam	Steam	Steam	Steam.
Ground storage capacity, tons.	6,500 to 8,000	20,000	15,000	35,000	40,000
Name of railroad connecting.	None	None	None	None	Duluth, South Shore & Atlantic; Canadian Pacific Ry.; Minneapolis, St. Paul & Sault Ste. Marie Ry.
Tracks on pier or wharf:					
Number	None	None	None	None	1.
Capacity, cars					15.
Supporting yards:					
Number	None	None	None	None	None.
Remarks	Loading record, 100 tons in 8 minutes.				

TABLE No. 168.—*Principal coal terminals on Lake Michigan*

Port	Calumet, Ill.				
Name or number	By-Products Coke Co.	Hedstrom-Schenck Coal Co.	Illinois Steel Co.	Lehigh Valley Coal Sales Co.	Philadelphia and Reading Coal Co.
Owner	do	Hedstrom Coal Co.	do	do	Do.
Operator	do	Hedstrom-Schenck Coal Co.	do	do	Do.
Exact location	Calumet River, west bank at One hundred and twelfth Street.	Calumet River at Ninety-fifth Street, south bank. Turning basin No. 1.		Calumet River, west bank near One hundred and first Street.	Calumet River, west bank at Ninety-fifth Street.
Type of construction	600 feet concrete, 600 feet piles.	Pile	Pile and masonry	Pile	Pile.
Dimensions, feet	1,200	671		1,572 feet in slip, 750 feet river.	350 feet in river, 800 feet in Howard Slip.
Depth of water along side	21 feet	19–20 feet	21 feet	750 feet at 20 feet, 1,000 feet at 15 feet.	19 feet.
Berthing capacity, feet	1,200	671		1,750	1,150.
Loading appliances:					
Storage pile or car to ship.		Scraping devices			
Type		Our own		Ottumwa box-car loader, steam operated.	
Capacity per hour per machine.		50 tons		200 tons	
Total number of machines.		10		1	
Unloading appliances:					
Ship to storage pile	One at the dock, one in the yard.			From boat to storage pile	
Type	Robins Conveying Belt Co.'s unloading towers (bucket unloading). The Wellman-Seaver-Morgan Co.'s revolving-car dumper; (yard) capacity in tons per hour, 1,200 tons.	Mead-Morrison Towers, clam shell.		Clam shell	
Capacity per hour per machine.	2 at 200 tons; 1 at 400 tons	100 tons		80 tons	
Total number of machines.	3	3		5	
How operated	2 steam; 1 electric	Steam		Steam	
Ground storage capacity	700,000 tons (300,000 docks; 400,000 yard).			100,000	
Name of railroad connecting.	Belt railway, West Indiana Ry. New York Central and St. Louis.	Chicago Short Line R. R.	Elgin & Joliet & Eastern R. R.	Belt railway	Western Indiana Belt R. R.

TABLE No. 168.—*Principal coal terminals on Lake Michigan*—Continued

Port	Calumet, Ill.—Continued				
Tracks on pier or wharf	None			Wharf	
Number		2		4	
Capacity, cars		20 to 30		120	
Supporting yards	Belt railway, adjoining the plant.			Belt yards	
Number	1				
Capacity, cars	100				
Remarks	Only receive coal; no shipment.		All coal received by rail	Loading or unloading records. Can load 2,600 tons per day. Unload 9,500 tons in 23 hours.	Terminal not in use.

Port	Calumet, Ill.—Continued	
Nane or number	Pittsburgh Coal Co. of Illinois.	Wisconsin Steel Co.
Owner	Erie R. R.	International Harvester Co.
Operator	Pittsburgh Coal Co. of Illinois.	Wisconsin Steel Co.
Exact location	Ninety-fourth Street and Calumet River, South Chicago, Ill.	Calumet River, west bank at One hundred and eleventh Street.
Type of construction	Pile	Concrete.
Dimensions, feet	300	932.
Depth of water alongside	20	21.
Berthing capacity	300	932.
Loading appliances:		
Storage pile or car to ship, type.	McMyler whirley derricks with 1-ton and 2½-ton buckets.	Nothing except the coal bridge which can load coal.
Capacity per hour per machine.	60 tons	
Total number of machines.	2	
Unloading appliances:		
Ship to car or storage pile, type.	Use same appliances as listed above.	Brown hoist.
Capacity per hour per machine.		600 tons.
Total number of machines.		1 unloading bridge.

Port	Calumet, Ill.—Continued	
Unloading appliances—Continued.		
How operated		Electrically.
Ground storage capacity tons.	2,200	125,000 net tons of coal.
Name of railroad connecting.	Chicago, Rock Island & Pacific.	Chicago, West Pullman & Southern Ry.
Tracks on wharf or pier:		
Number	1	2.
Capacity, cars	3	30.
Supporting yards		Chicago, West Pullman & Southern Ry.
Number	None	
Distance from terminal.		
Capacity, cars		Unloading record is 19 hours, 15 minutes for a 10,000-ton boat.
Remarks	Handle bituminous coal exclusively which is received by rail. Business consists in the fueling of lake steamers; no coal is transshipped by rail in carload lots. Use steam-operated lighter for loading with capacity of 300 tons per hour.	

Port	Chicago, Ill.	
Name or number	Eldridge Coal Co	Crerar Clinch Coal Co.
Owner	do	Illinois Central R. R. Co.
Operator	do	Crerar Clinch Coal Co.
Exact location	1931 Mendell Street, North Branch, Chicago River, near Cortland Street.	Mouth of Chicago River, south side, at East South Water Street.
Type of construction	Pile	Sheet piling.
Dimensions, feet	300 by 250	300.
Depth of water alongside. feet	18	12.
Berthing capacity, feet	300	300.
Loading applicances:		
Storage pile or car to ship	None	Storage pile to hopper to ½-ton wheel carts, capacity up to 100 tons.
Capacity per hour per machine	None	
Total number of machines	None	
Unloading appliances:		
Type	Cranes and buckets	Cranes, steam.
Capacity per hour per machine	50 to 60 tons	100 tons.
Total number of machines	2	1.
How operated	Steam	Steam.
Ground storage capacity, tons	15,000	2,500.
Name of railroad connecting	Chicago & North Western	Illinois Central.
Tracks on pier or wharf:		
Number	2	2.
Capacity, cars	18	4.
Supporting yards, railroad	Chicago & North Western	Illinois Central.
Number	2	1.
Capacity, cars	18	Approximately 100.

TABLE NO. 168.—*Principal coal terminals on Lake Michigan*—Continued

Port	Chicago, Ill.—Continued		
Name or number	E. L. Hedstrom Coal Co	By-Products Coke Corporation Coal Dock	No. 136.
Owner	do	do	Consumers Co.
Operator	do	do	Do.
Exact location	North Branch, Chicago River, east bank at Division Street.	On slip west side of Calumet River dock line 691 feet north of center line of One hundred and twelfth Street.	Foot of East South Water Street, mouth of Chicago River.
Type of construction	Wood	Boat unloading section, concrete; balance wood.	Webster Manufacturing Co. special electric boat-loading machine.
Dimensions (feet)	300 by 550	Dock about 1,200 long; coal storage 1,480 long, 238 wide.	90 (30 over water) by 600.
Depth of water alongside, feet	15	Dredged as required to 22	24.
Berthing capacity, feet	550	1,200	600.
Loading appliances:			
Type			225-ton Hopper fed by crane.
Capacity per hour per machine			300.
Total number of machines			1.
Unloading appliances:			
Ship to storage pile or car		Unloading rigs onto conveyor system which delivers to pile	
Type	Mead-Morrision		
Capacity per hour per machine	100 tons	Steam rigs, 250 tons per hour; electric rigs, 300 tons per hour.	
Total number of machines	2	3	
How operated	Steam	2 steam, 1 electric	
Ground storage capacity, tons	25,000	300,000	800.
Name of railroad connecting	C. M. & St. P	No direct railroad connection to dock	Illinois Central.
Tracks on pier or wharf:			
Number	1		4.
Capacity, cars	12		40.
Supporting yards, railroad			Illinois Central.
Capacity, cars			40.

Port	Chicago, Ill.—Continued		
Name or number	International Harvester	Susquehanna Coal Co	Division Street Dock.
Owner	International Harvester Co. Wisconsin Steel Works.	do	Delaware, Lackawanna & Western Coal.
Operator	do	do	Do.
Exact location	One hundred and Eleventh Street and Calumet River, west bank.	West bank of North Branch, Chicago River, at Elston Avenue and Division Street.	E. L. Hedstrom Coal Co., agents, 1110 W. Division St., east bank of South Branch, Chicago River.
Type of construction	Concrete dock	Inclosed dock, steel and concrete	Wood.
Dimensions, feet	932	Approximately 600 by 120	500 by 600.
Depth of water alongside, feet	22	19	16.
Berthing capacity, feet	932	520	550.
Loading appliances:			
Storage pile or car to ship	No loading appliances, but unloading equipment could be used for the same class of loading in case of emergency.	3 unloading towers and trimmer conveyors to storage. Underground conveyors, storage to retain bins and railroad car loading.	
Capacity per hour per machine		Unloading capacity 400 tons per hour	
Unloading appliances:			
Type	Brown Hoisting Machinery Co. Unloading bridge, 10-ton bucket. This machine unloads from ship to storage pile or onto cars.	Operation by steam towers. All other machinery electrical.	Mead-Morrison machines.
Capacity per hour per machine	500 tons		150 tons.
Total number of machines	1 bridge		2.
How operated	Electric motors, man trolley		Steam.
Ground storage capacity, tons	125,000	100,000 anthracite	50,000.
Name of railroad connecting	Chicago, West Pullman & Southern	Chicago & North Western	C., M. & St. P.
Tracks on pier or wharf:			
Number	3	1	2.
Capacity, cars	56	20	20.
Supporting yards, railroad	Chicago, West Pullman & Southern	Chicago & North Western, North Avenue yard.	
Number	1		
Capacity, cars	600		
Remarks		Owner reports dock not in operation. Due to conditions in anthracite trade, will probably be torn down and land used for other purposes.	The E. L. Hedstrom Coal Co. are the agents for the Delaware, Lackawanna & Western Coal Co., and in charge of sales from this dock.

TABLE No. 168.—*Principal coal terminals on Lake Michigan*—Continued

Port	Chicago, Ill.—Continued		
Name or number	Lehigh Valley Coal Sales Co	Eureka Coal Co.	New Kentucky Coal Co.
Owner	do	L. F. Dreiske, Hollywood, Calif	Do.
Operator	do	Eureka Coal Co	Do.
Exact location	Chicago River, North Branch, Clifton Avenue and Cortland Street.	Chicago River, North Branch, west bank at Cortland Street.	Chicago River, south side at foot of East South Water Street.
Type of construction	Pile	Pile	Pile.
Dimensions, feet	450	300	275.
Depth of water alongside, feet	20	18–20	18–20.
Berthing capacity, feet	450	300	275.
Loading appliances:			
Storage pile or car to ship		None	2 derricks and buckets.
Type	Link belt conveyors		
Capacity per hour per machine			50 tons from cars, fueling 150 tons.
Total number of machines			2.
Unloading appliances:			
Ship to storage pile or car		Mead-Morrison hoists and clam shells. (Not used, no coal received by water.)	2 derricks and buckets.
Type	Clam-shell buckets		
Capacity per hour per machine	50 tons		50 tons.
Total number of machines	4	2	2.
How operated	Steam	Steam	Steam.
Ground storage capacity, tons	100,000	3,000	6,000.
Name of railroad connecting	Chicago, Milwaukee & St. Paul	Chicago, Milwaukee & St. Paul	Illinois Central.
Tracks on pier or wharf:			
Number	3		1.
Capacity, cars	40		12.
Supporting yards, railroad	Chicago, Milwaukee & St. Paul		
Remarks	No water-borne coal handled over this terminal since 1927.	Receives coal only by rail	No coal received by water. Business, fueling steamers and all floating plant.

Ports	Menominee, Mich.	Escanaba, Mich.		Green Bay, Mich.		
Name or number	Central West Coal Co.	Chicago, Milwaukee, St. Paul & Pacific coal docks.	The C. Reiss Coal Co.	Cleveland Cliffs Iron Co., Green Bay Dock.	F. Hurlbut Co.	The C. Reiss Coal Co.
Owner	do	do	Chicago & North Western Ry.	do	do	Do.
Operator	do	Escanaba Coal & Dock Co.	The C. Reiss Coal Co.	do	do	Do.
Exact location	Foot of Pengilly Street.	North Escanaba	Foot of 10th Street	Immediately south of Chicago & North Western Bridge, west side Fox River.	North end of Washington Street, east side of river.	West side Fox River between St. Paul R. R. bridge and Mason Street Bridge.
Type of construction	Pile and concrete	Wood	Pile and timber	Pile and timber, concrete front.	Pile and timber	One-half pile and timber; one-half pile and concrete.
Dimensions, feet	1,800	1,000 by 400	1,400 by 160	1,200 by 400	1,400	2,100.
Depth of water alongside, feet	19	24	19½	19 to 20	20	22.
Berthing capacity, feet	1,800	1,000	1,400	1,400	1,400	1,900.
Unloading appliances:						
Ship to car or storage pile, type.	Wisconsin Bridge & Iron Co. unloading bridge equipped with 5-ton clam.	Mead-Morrison portable bridge.	Mead-Morrison portable bridge.	Mead-Morrison unloading bridge, 5-ton clam.	Wisconsin Bridge & Iron Co., man trolley 3-ton clam.	Heyl - Patterson unloading bridge, 7½-ton clam.
Capacity per hour per machine.	200 tons	350 tons	350 tons	300 tons	200 tons	500 tons.
Total number of machines	1	1	1	1	1	2.
How operated	Electric	Electric	Electric	Electric	Electric	Electric.
Ground storage capacity tons	200,000	125,000	14,000 anthracite; 100,000 bituminous.	250,000	200,000	550,000 soft coal; 80,000 hard coal.
Name of railroad connecting	Chicago & North Western Ry.; Chicago, Milwaukee, St. Paul & Pacific R. R.; Wisconsin & Michigan R. R.	Chicago, Milwaukee, St. Paul & Pacific and Escanaba & Lake Superior Rys.	Chicago & North Western, interchange tracks at Wells with C., M., St. P. & P. and Soo Line.	Chicago & North Western Ry; Chicago, Milwaukee, St. Paul & Pacific R. R.; Green Bay & Western R. R.	Chicago, Milwaukee, St. Paul & Pacific interchange; Green Bay & Western R. R.; Chicago & North Western Ry.	Green Bay & Western; Chicago, Milwaukee, St. Paul & Pacific; and Chicago & North Western Rys.
Tracks on pier or wharf:						
Number	2	2	2	None	3	3.
Capacity, cars	30	40 cars (ore cars)	50		35	75.
Supporting yards:						
Number	None	1	1	1	None	1.
Distance from terminal		⅛ to ¼ mile	1 mile	At terminal		At terminal.
Capacity, cars		200	700	50		40.
Remarks	Unloading record: 6,600 tons in 31½ hours.	Unloading record: 3,500 tons in 10 hours.	Unloading record: 3,500 tons in 10 hours.	Unloading record: 8,000 tons in 25 hours.	Unloading record: 2,500 tons in 10 hours.	Unloading record: 10,000 tons in 10 hours.

TABLE No. 168.—*Principal coal terminals on Lake Michigan*—Continued

Ports	Indiana Harbor, Ind.	Kenosha, Wis.	Manitowoc, Wis.		Marinette, Wis.
Name or number	Inland Steel Co	Baldwin Coal Co	Manitowoc Land & Fuel Co.	The C. Reiss Coal Co	Marinette Fuel & Dock Co.
Owner	do	do	Lehigh Valley Coal Co	Chicago & North Western Ry.	Do.
Operator	do	do	Manitowoc Land & Fuel Co.	The C. Reiss Coal Co	Do.
Exact location	East bank, entrance to Indiana Harbor canal.	Foot of Third Avenue	Quay Street, between Eighth and Sixth Streets.	Foot of Troy Street	Foot of Ogden Street on Menominee River.
Type of construction	Pile, masonry, and concrete	Pile and timber	Pile and timber	Pile and timber	Wood and pile.
Dimensions, feet	2,500	600	465	1,000	1,500.
Depth of water alongside, feet.	21	19	18	21	20.
Berthing capacity, feet.	2,500	600	230	1,000	1,500.
Unloading appliances:					
Ship or car to storage pile, type.	Robins Belt Conveyor Co. coal tower.			Heyl-Patterson unloading bridge.	Steam locomotive crane and gas caterpillar.
Capacity per hour per machine.	125 tons			350	
Total number of machines.	2 used in unloading only			1	
How operated				Electric	
Ground storage capacity, tons.	200,000	15,000	18,000	175,000	40,000.
Name of railroad connecting.	Indiana Harbor Belt R. R.	Chicago & North Western Ry.	Chicago & North Western Ry.	Chicago & North Western Ry.	Chicago, Milwaukee, St. Paul & Pacific and Chicago & North Western Rys.
Tracks on pier or wharf:					
Number	2 stub end tracks	None	1	2	One for crane.
Capacity, cars	25 each track		5	50	
Supporting yards:					
Number		None	None		
Distance from terminal				Calumet yard, Chicago & North Western, at outskirts of city.	
Remarks		All coal consumed locally			

Port	Milwaukee, Wis.			
Name or number	Callaway Fuel Co	Fellenz Coal & Dock Co	Wis. Great Lakes Coal & Dock Co.	Lehigh Valley Coal Sales Co.
Owner	do	do	do	Do.
Operator	do	do	do	Do.
Exact location	Wharf on left bank of Milwaukee River, foot of Ogden Street.	Wharf on right bank of Milwaukee River, foot of Humboldt Avenue.	Right bank of Menominee River, foot of Twentieth Street.	Left bank South Menominee Canal, Wagner Slip, Canal Street and Fifth Avenue.
Type of construction	Pile	Pile	Pile	Pile.
Dimensions	572 feet	300 feet long	2,000 feet	300 feet long and slip 900 feet, not used.
Depth of water alongside	18 feet	19 feet	19 feet	18.5 feet.
Berthing capacity, feet.	504	320	1,200	504.
Unloading appliances:				
Ship to car or storage pile, type.	Bridge, lakeside	Steel tower, lakeside bridge, and steel.	Mead-Morrison portable bridge	Mead-Morrison steel towers, hoists.
Capacity per hour per machine.	250 tons	360 tons	600 tons	300 tons.
Total number of machines	1	1	2	2.
How operated	Electricity	Electricity	Electricity	Steam.
Ground storage capacity, tons	37,000	60,000	575,000	75,000 tons under cover.
Name of railroad connecting	None	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur).	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur).	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur line).
Tracks on pier or wharf:				
Number	None	1	1	3.
Capacity, cars		7	50	30.
Supporting yards:				
Number	20	10		15.
Distance from terminal	4 miles	4 miles		4 miles.
Capacity, cars	300	50		600.
Remarks: Unloading records		7,000 tons in 20 hours		11,000 tons in 19 hours.

TABLE NO. 168.—*Principal coal terminals on Lake Michigan*—Continued

Port	Milwaukee, Wis.—Continued				
Name or number	Milwaukee Coke & Gas Co.	West Side Dock	Milwaukee Gas Light Co.	Thirteenth Street Dock	Sixteenth Street Dock.
Owner	do	Milwaukee Gas Light Co.	do	Milwaukee Western Fuel Co.	Fred Bradford et al.
Operator	do	United Coal & Dock Co.	do	do	Milwaukee - Western Fuel Co.
Exact location	Left bank of Kinnickinnic River, foot Lapham Street.	Left bank of Menominee River, foot Twentieth Street.	Left bank of Menominee River, between Twenty-first and Twenty-fifth Streets.	Left bank of Menominee River, between Thirteenth and Fifteenth Streets.	Left bank of Menominee River and Sixteenth Street.
Type of construction	Piling with concrete superstructure.	Concrete on piles	Concrete on piles	Concrete on piles	Concrete on piles.
Dimensions, feet	660 long	350	1,600 long (650 feet used for coal).	1,200 by 325	1,200 by 325.
Depth of water alongside	18 feet	18 feet	19 feet	20 feet	20 feet.
Berthing capacity, feet	650	650	650	Two 500	Two 500.
Unloading appliances:					
Storage pile or car to ship, type.	1 Thompson & Green electric portable tower. 2 Brown steam hoists.	Brown bridge	3 hoists, steam, portable bridges, Brown.	Bridge, Mead-Morrison	Bridges, 1 to 8 tons, Mead-Morrison man trolley.
Capacity per hour per machine.	200 tons	125 tons	100 tons	600 tons	1,500 tons.
Total number of machines.	3	3	3	1	2 bridges.
How operated	Steam and electricity	Steam	Steam and electricity	Electricity	Electricity.
Ground storage capacity, tons.	350,000	50,000	130,000	200,000	230,000.
Name of railroad connecting.	Chicago & North Western and Chicago, Milwaukee, St. Paul & Pacific R. R. (main lines).	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur).	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur line).	Chicago, Milwaukee, St. Paul & Pacific R. R.	Chicago, Milwaukee, St. Paul & Pacific R. R.
Tracks on pier or wharf:					
Number	20 in yard	1	1	1	3.
Capacity, cars	175 in yard	16	20	25	50.
Supporting yards:					
Number	None	None	None	13	13.
Distance from terminal				2 to 3 miles	2 to 3 miles.
Capacity, cars				87	87.
Remarks: Unloading records.	10,000 tons in 18 hours	12,000 tons in 32 hours	11,000 tons in 38 hours	10,000 tons in 36 hours	10,000 tons in 20 hours.

Port	Milwaukee, Wis.—Continued				
Name or number	Washington Street Dock	Greenfield Avenue Dock	Kinnickinnic Avenue Dock	Commerce Street Dock	Cherry Street Dock.
Owner	Harbor Land Co	Milwaukee-Western Fuel Co.	Milwaukee-Western Fuel Co.	Alliance Investment Co	Milwaukee-Western Fuel Co.
Operator	Milwaukee-Western Fuel Co	do	do	Milwaukee-Western Fuel Co.	Do.
Exact location	Left bank of Kinnickinnic Basin and Washington Street.	Left bank of Kinnickinnic Basin and Greenfield Avenue.	Right bank of Kinnickinnic River and Kinnickinnic Avenue.	Right bank of Milwaukee River, Commerce Street.	Right bank of Milwaukee River, Cherry Street.
Type of construction	Timber on piles	Timber on piles	Timber on piles	Timber on piles	Timber and concrete on piles.
Dimensions, feet	500 by 1,200	275 by 1,200	548 by 280	1,200 feet of dock	500 by 200.
Depth of water alongside	20 feet	19 feet	19 feet	19 feet	19 feet.
Berthing capacity, feet	One 500	Two 500	One 500	Three 400-foot boats	One 400, one 200.
Unloading appliances:					
Ship to car or storage pile, type.	Mead-Morrison portable towers with one 5-ton and two 2-ton buckets.	Heyl and Patterson bridges with 2-ton buckets.	Johnson portable towers with 1-ton buckets.	Heyl and Patterson bridges with 2-ton buckets.	Johnson portable towers with 1-ton buckets.
Capacity per hour per machine.	150 tons	125 tons	100 tons	150 tons	100 tons.
Total number of machines.	3	3	5	2	6.
How operated	Electricity	Electricity	Steam	Electricity	Electricity.
Ground storage capacity (tons).	250,000	150,000	65,000	95,000	75,000.
Name of railroad connecting.	Chicago & North Western Ry.	Chicago & North Western Ry.	Chicago & North Western and Chicago, Milwaukee, St. Paul & Pacific R. R.	Chicago, Milwaukee, St. Paul & Pacific R. R.	None.
Tracks on pier or wharf:					
Number	4	2	2	1	Do.
Capacity, cars	80	40	12	20	
Supporting yards:					
Number	10	10	10	6	
Distance from terminal	2 to 5 miles	2 to 5 miles	2 to 10 miles	2 to 3 miles	
Capacity, cars	36	36	36	27	
Remarks: Unloading records.	10,000 tons in 24 hours	10,000 tons in 32 hours	8,000 tons in 20 hours	7,000 tons in 36 hours	8,000 tons in 20 hours.

TABLE NO. 168.—*Principal coal terminals on Lake Michigan*—Continued

Port	Milwaukee, Wis.—Continued			
Name or number	Philadelphia & Reading Coal & Iron Co.	Schlitz Brewing Co	Gross Dock	Independent Dock.
Owner	do	do	United Coal & Dock Co	United Coal & Dock Co.
Operator	do	do	do	Do.
Exact location	Wharf on right bank of Menominee River, Canal and Sixteenth Street.	Wharf on right bank of Milwaukee River, foot of Galema Street.	Right bank of Menominee River and Holton Canal, Canal Strect and First Avenue.	Left bank of Kinnickinnic Basin, foot of National Avenue.
Type of construction	Concrete on piling	Concrete on piles	Timber on piles	Concrete on piles.
Dimensions, feet	980	555	450	765.
Depth of water alongside	21 feet	20 feet	19 feet	19 feet.
Berthing capacity, feet	532	320	444	650.
Unloading appliances:				
Storage pile or car to ship, type.	Wood towers, Brown	Ole Johnson bridge hoists	Mead-Morrison tower hoist	Lakeside bridge, portable.
Capacity per hour per machine.	8 tons	125 tons	150	200.
Total number of machines	4	1	4	2.
How operated	Steam	Electricity	Steam	Electricity.
Ground storage capacity, tons	75,000 in shed	50,000	120,000	90,000.
Name of railroad connecting	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur).	Chicago, Milwaukee, St. Paul & Pacific R. R. (spur).	Chicago, Milwaukee, St. Paul & Pacific R R. (spur).	Chicago & North Western Ry. (spur).
Tracks on pier or wharf:				
Number	2	1	2	2.
Capacity, cars		10	10	28.
Supporting yards:				
Number	25			
Distance from terminal	4 miles			
Capacity, cars	150			
Remarks: Unloading records		7,000 tons in 56 hours	9,000 in 15 hours	12,000 in 30 hours.

Ports	Milwaukee, Wis.—Contd.	Racine, Wis.			
Name or number	Youghiogheny & Ohio	No. 2	No. 1	Nos. 2 and 3	Wisconsin Gas & Electric Co
Owner	Youghiogheny & Ohio Coal Co.	United Fuel & Supply Co	W. H. Pugh Coal Co	W. H. Pugh Coal Co	Do.
Operator	do	do	do	do	Do.
Exact location	Left bank of South Menominee Canal and Wagner Slip, Canal Street and Fourth Avenue.	931 Street	State and Ontario Streets	Foot of Michigan Street	Foot of Second Street.
Type of construction	Pile	Pile and timber	Pile and timber	Pile and timber	Pile and timber.
Dimensions	1,100 feet, including slip	265 feet	520 feet	1,800 feet	900 feet.
Depth of water alongside	20 feet	16 feet	16 feet	18–21 feet	18 feet.
Berthing capacity	440 feet	265 feet	520 feet	1, 800 feet	900 feet.
Unloading appliances:					
Ship to car or storage pile, type.	Mead-Morrison electric portable bridge hoist.			Link Belt Bridge	Fixed hopper whirly with 2-ton clam and 50-foot drop boom.
Capacity per hour per machine.	350 tons			300 tons	180 tons.
Total number of machines.	2			1	1.
How operated	Electricity			Electricity	Electricity.
Ground storage capacity	145,000 tons	25,000 tons	60,000 tons	125,000 tons	170,000 tons.
Name of railroad connecting.	Chicago, Milwaukee St. Paul & Pacific R. R.	Chicago, Milwaukee St. Paul & Pacific R. R.	Chicago, Milwaukee St. Paul & Pacific R. R.	Chicago, Milwaukee St. Paul & Pacific R. R.	Chicago, Milwaukee St. Paul & Pacific R. R.
Tracks on pier or wharf:					
Number	None	None	None	None	None.
Supporting yards:					
Number			1	1	
Distance from terminal				At termina	
Capacity, cars				15	
Remarks: Unloading records.	8,000 tons in 12 hours	All coal consumed locally	All coal consumed locally	All coal consumed locally	5,100 tons in 25 hours. All coal consumed in plant. Biproduct coke also consumed locally.

TABLE NO. 168.—*Principal coal terminals on Lake Michigan*—Continued

Ports	Sheboygan, Wis.		Two Rivers, Wis.	Waukegan, Wis.
Name or number	Sheboygan Coal Co. Dock	The C. Reiss Coal Co	The C. Reiss Coal Co	Waukegan Coal Co.
Owner	do	do	do	Do.
Operator	do	do	do	Do.
Exact location	Foot of Virginia and Jefferson Streets.	Eighth Street east to Lake	Washington Street Bridge	Slip No. 1.
Type of construction	Pile and timber	Pile and timber with concrete face	Pile and timber	Wood and steel.
Dimensions	420 feet	3,700 feet	850 feet	1,200 feet.
Depth of water alongside	18 feet	19 feet	15 feet	19 feet.
Berthing capacity	420 feet	1,000 feet	850 feet	600 feet.
Loading appliances:				
Storage pile or car to ship, type.				Mead-Morrison bridge and hoist.
Capacity per hour per machine.				200 tons.
Total number of machines				2.
How operated				Steam.
Unloading appliances:				
Ship to car or storage pile, type.		4 Mead-Morrison towers and 1 Heyl & Patterson bridge with 2-ton clam.	Unloading bridge with boom and 1½-ton bucket.	Both ways, Mead-Morrison bridge and hoist.
Capacity per hour per machine.		250 tons	35 tons	200 tons.
Total number of machines		5	1	2.
How operated		Bridge, electric; towers, steam	Steam	Steam.
Ground storage capacity	15,000 tons	320,000 tons	36,000 tons	100,000 tons soft, 80,000 tons hard.
Name of railroad connecting	None	Chicago & North Western Ry	Chicago & North Western Ry	East Joliet and Erie R. R.
Tracks on pier or wharf:				
Number	None	None	None	4.
Capacity, cars				45.
Supporting yards:				
Number		1		
Distance from terminal		At terminal		
Capacity, cars		150		
Remarks	All coal consumed locally	Chicago & North Western has storage yard about 2 miles from city of Sheboygan with 1,250 cars capacity.		7,900 tons in 18 hours.

TABLE No. 168.—*Principal coal terminals on Detroit and St. Clair Rivers*

Ports	Detroit, Mich.	Port Huron, Mich.	
Name or number	Pine Ridge Coal Co	Miller Coal & Dock Co	Morton Salt Co.
Owner	A. D. Cronin	do	Do.
Operator	Pine Ridge Coal Co	do	Do.
Exact location	Foot of Hastings Street	2358 Military Street, between Jenkinson and Beard Streets.	About 3½ miles below mouth of Black River.
Type of construction	Wood	Sheet-steel piling bulkhead	Wakefield sheet piling bulkhead.
Dimensions, feet	500 long, 100 wide	445	1,250.
Depth of water alongside, feet.	26	22	16½.
Berthing capacity, feet	500	Largest lake carriers	1,250.
Loading appliances:			
Storage pile or car to ship, type.		Bunkering only. Coal is received by conveyor boats which discharge to storage pile. Two steam cranes of 150 and 100 tons per hour capacity used to place coal in the 4 elevated pockets for bunkering ships. Two pockets of 75 tons each, one 50 and one of 6 tons. Vessels can be bunkered at rate of about 250 tons per hour.	None.
Capacity per hour per machine.	100 tons		
Total number of machines.	2		
Unloading appliances:			
Ship to car or storage pile, type.		None	Locomotive cranes for distributing to storage. Mead-Morrison unloader, with 3-ton bucket.
Capacity per hour per machine.			Normal 100 tons, maximum 240 tons.
Number of machines			One unloader, 2 locomotive cranes.
How operated	Steam		Unloader, electric.
Ground storage capacity, tons.	10,000	6,000	75,000.
Name of connecting railroad	Grand Trunk R. R	None	Port Huron & Detroit Switch Line, connecting with Grand Trunk and Pere Marquette Rys.
Tracks on pier or wharf:			
Number	3	None	4.
Capacity, cars	45		30.
Supporting yards:			
Number	None	None	Yards of connecting railroads.
Remarks	Unload hopper cars into high bins, 1 car in 30 minutes. Unload flat-bottom gondolas into stock pile, 1 car in 20 minutes.	Coal received largely from West Virginia	Private coal unloading plant used in connection with mining of salt by brine method.

RAILROAD CONNECTIONS AT UPPER LAKE PORTS TRANSSHIPPING LAKE COAL TO NORTHWEST TERRITORY

The ports of Duluth-Superior at the head of navigation on Lake Superior, and Milwaukee on the west shore of Lake Michigan are the transshipping points for lake coal to the Northwest States and a section of Canada.

At Duluth-Superior the harbor is served by 11 railroads, as follows:

Chicago, Milwaukee, St. Paul & Pacific Railroad.

Northern Pacific Railway.

Great Northern Railway.

Chicago, St. Paul, Minneapolis & Omaha Railway (Chicago & North Western system).

Minneapolis, St Paul & Sault Ste. Marie Railway.

Duluth, Winnipeg & Pacific Railway (Canadian Northern system).

Duluth & Iron Range Railway (United States Steel Corporation).

Duluth, Messabe & Northern Railway (United States Steel Corporation).

Duluth, South Shore & Atlantic Railway.

Interstate Transfer Railway (United States Steel Corporation).

Lake Superior Terminal & Transfer Railway.

The last two railways serve as belt-line connections for the other railways entering the twin ports.

Milwaukee is served by:

Chicago & North Western Railway.

Chicago, Milwaukee, St. Paul & Pacific Railroad.

Chicago, North Shore & Milwaukee Railroad.

Grand Trunk Railway system.

Minneapolis, St. Paul & Sault Ste. Marie Railway.

Pere Marquette Railway.

The various railroads having rail connections with the coal docks at Duluth-Superior and Milwaukee are shown in the tables describing the coal docks, under the heading of "Methods of unloading, description of facilities, and storage areas."

RAIL AND LAKE RATES ON COAL

The originating territory for lake coal includes the mining districts in the States of Ohio, Pennsylvania, West Virginia, Virginia, Tennessee, and eastern Kentucky. The rate controversy between railroads serving the coal producing districts of these States, which has been before the Interstate Commerce Commission for many years, was precipitated with renewed turbulence in 1928. Limited space precludes a full discussion of this interesting feature of the lake coal trade, and this chapter will be confined to a presentation of the present rates applying all-rail and via the Lakes. The following tables show the rail rates from mining districts to ports on Lake Erie as well as the

all-rail rates from the same districts to points in the northwestern territory served chiefly by the upper lake docks. Referring to Table No. 169 it will be seen that in the majority of instances the rates from a district to all ports served are the same. From a few of the districts the rates vary over the lines of different carriers to the same port or to different ports.

TABLE No. 169.—*Rates on bituminous coal, carloads from mining districts to Lake Erie ports (lake cargo rates)*

[In effect Oct. 28, 1929. In cents per ton of 2,000 pounds]

From	To								
	Toledo	Sandusky	Huron	Lorain	Cleveland	Fairport	Ashtabula	Conneaut	Erie
OHIO DISTRICTS									
Massillon	------	133	128	128	128	------	128	------	------
Deerfield	------	133	128	128	128	------	128	------	------
Middle	------	128	128	128	128	------	128	------	------
No. 8	------	143	143	143	143	------	143	------	143
Cambridge	------	143	143	143	143	------	143	------	143
Crooksville	143	143	143	143	[1] 143	------	------	------	------
Hocking	143	143	------	143	------	------	------	------	------
Shawnee	143	143	------	143	------	------	------	------	------
Pomeroy	143	143	------	143	------	------	------	------	------
Jackson County	143	143	------	------	------	------	------	------	------
PENNSYLVANIA DISTRICTS									
Butler-Mercer	------	------	------	------	------	------	------	114	------
Reynoldsville	------	------	------	------	------	------	------	------	131
Freeport	------	------	------	------	------	------	------	131	131
Pittsburgh, Pa.-W. Va	------	146	146	146	146	146	146	------	146
Saltsburg	------	------	------	------	153	------	153	------	153
Derry	------	------	------	------	153	------	153	------	153
Ligonier	------	------	------	------	158	------	158	------	158
Blairsville	------	------	------	------	158	------	158	------	158
New Florence	------	------	------	------	166	------	166	------	166
Indiana	------	------	------	------	166	------	166	------	166
Vintondale	------	------	------	------	183	------	183	------	183
Connellsville	------	154	------	154	154	154	154	------	154
Altoona	------	------	------	------	173	------	173	------	173
Spangler	------	------	------	------	183	------	183	------	183
Bellwood	------	------	------	------	183	------	183	------	183
Cherry Tree	------	------	------	------	188	------	188	------	188
Meyersdale No. 1	------	173	------	173	------	173	------	------	------
Clearfield	------	------	------	------	223	------	223	------	223
WEST VIRGINIA DISTRICTS									
Fairmont	------	166	------	166	166	166	166	------	166
Ohio River	------	181	------	181	------	181	------	------	------
Belington	------	181	------	181	------	181	------	------	------
Kenova	181	181	------	------	------	------	------	------	------
Thacker, W. Va.-Ky	181	181	------	------	------	------	------	------	------
Cumberland-Piedmont, W. Va.-Md	------	183	------	183	------	183	273	------	273
Gauley	------	183	------	183	------	183	------	------	------
Kanawha	181	181	------	------	------	------	------	------	------
Tug River	196	196	------	------	------	------	------	------	------
Pocahontas	196	196	------	------	------	------	------	------	------
VIRGINIA DISTRICTS									
Clinch Valley, No. 1 and 2	196	196	------	------	------	------	------	------	------
Stonega	196	196	------	------	------	------	------	------	------
Radford	231	231	------	------	------	------	------	------	------
KENTUCKY DISTRICTS									
Kentucky	181	181	------	------	------	------	------	------	------
Big Sandy	181	181	------	------	------	------	------	------	------
Hazard	181	181	------	------	------	------	------	------	------
Harlan, Ky.-Tenn	181	181	------	------	------	------	------	------	------
McRoberts	181	181	------	------	------	------	------	------	------

[1] Rate applies to Cleveland Pier Q.

Tariff authorities: Agent F. V. Davis, I. C. C. 47; B. & O. R. R., I. C. C. 2631 and 2620; Penn. R. R., I. C. C. AA2178 and 1334 and 1324; Norfolk & Western, I. C. C. 3096-B; Bessemer & L. Erie, I. C. C. 818; Louisville & Nashville, I. C. C. A-15930.

NOTE.—None of the above rates include charges for transfer from cars to vessels.

TABLE NO. 170.—*All rail rates on bituminous coal, carloads, from Pennsylvania, West Virginia, Maryland, and Ohio regions and districts to western points*

[In effect Nov. 8, 1929. In cents per ton]

To—	From regions								From			
			West Virginia			Pittsburgh-Youghiogheny			Ohio coal districts			B. & O. R. R. various mines in West Virginia
	Cumberland-Piedmont and Gauley	Meyersdale	Roaring Creek	Upshur	Other districts	Connellsville and Fairchance	Finleyville, Scott Haven, Washington Run	Klondike	St. Clairsville No. 8, Wheeling Creek No. 8, Cambridge, Jackson County, and Shawnee	Crooksville Middle	Massillon	Canyon mine, Ida mine, Laurel, Furnan, Horton No. 6 mine, Morgan's Run Junction
Aberdeen, S. Dak.[1]	685	685	670	670	670	670	670	670	635	625	610	670
Des Moines, Iowa[1]	505	505	490	490	490	490	490	490	455	445	430	490
Fountain City, Wis.[2]	535	535	520	520	520	520	520	520	485	475	460	520
Kansas City, Mo.[2]	568	568	553	553	553	553	553	553	518	508	493	553
Minneapolis, Minn.[3]	555	555	540	540	540	540	540	540	505	495	480	540
Marshall, Minn.[1]	626	626	606	606	606	606	606	606	571	561	546	606
Madison, Wis.[1]	487	487	467	467	467	467	467	467	432	422	407	467
Omaha, Nebr.[1]	568	568	553	553	553	553	553	553	518	508	493	553
Pierre, S. Dak.[1]	752	752	737	737	737	737	737	737	702	692	677	737
Prairie du Chien, Wis.[2]	530	530	515	515	515	515	515	515	480	470	455	515
St. Paul, Minn.[3]	555	555	540	540	540	540	540	540	505	495	480	540
Sioux City, Iowa[1]	615	615	600	600	600	600	600	600	565	555	540	600
Sioux Falls, S. Dak.[3]	635	635	620	620	620	620	620	620	585	575	560	620
Watertown, S. Dak.[1]	635	635	620	620	620	620	620	620	585	575	560	620
Winona, Minn.[2]	535	535	520	520	520	520	520	520	485	475	460	520

[1] Chicago & Northwestern Ry.
[2] Chicago, Burlington & Quincy R. R.
[3] Chicago, St. Paul, Minneapolis & Omaha Ry.

Mines and stations included in above regions and districts are shown in detail in the following tariffs. Baltimore & Ohio R. R. I. C. C. C. & C. 2646 and 2654 and Chicago & Northwestern Railway I. C. C. 9676:

TABLE NO. 171.—*Rail rates on bituminous coal in carload lots from various mines in the States of Kentucky, Tennessee, and Virginia on Louisville & Nashville R. R. (Grouped as shown below)*

[In effect Nov. 6, 1929. In cents per ton of 2,000 pounds]

To—	Groups			
	1	2	3	4
St. Paul, Minn.[1]	540	555	540	540
Minneapolis, Minn.[1]				
Minneapolis Transfer[1]				
Marshall, Minn.[2]	606	626	606	606
Winona, Minn.[1]	520	535	520	520
Granite Falls, Minn.[3]	620	635	620	620
Des Moines, Iowa[2]	490	505	490	490
Sioux City, Iowa[2]	600	615	600	600
Sioux Falls, S. Dak.[3]	620	635	620	620
Pierre, S. Dak.[2]	737	752	737	737
Watertown, S. Dak.[2]	620	635	620	620
Aberdeen, S. Dak.[2]	670	685	670	670
Mobridge, S. Dak.[3]	725	740	725	725
Omaha, Nebr.[2]	553	568	553	553
Kansas City, Mo.[1]	553	568	553	553
St. Louis, Mo.[4]	297	312	297	312
Racine, Wis.[2]	376	391	376	376

[1] Chicago, Burlington & Quincy delivery.
[2] Chicago & North Western delivery.
[3] Chicago, Milwaukee, St. Paul & Pacific R. R. delivery.
[4] Louisville & Nashville delivery.

Group 1 includes Watts Creek, Jellico Coal Co., Yancey, Woodbine, Standard mine, and Excelsior, Ky., and Cumberland Gap, Tenn.

Group 2 includes Big Stone Gap, Esserville, Dominion, Glamorgan, Imperial, Osaka, Pardee, and other points in Virginia.

Group 3 includes Ashco, Blue Diamond, Bluefield, Carbon Glow, Elsie coal, Elsie No. 1, 2, and 4, and Windon, Ky., and various other points.

Group 4 includes Consolidation mines No. 210 to 215; Elkhorn mines Nos. 301-306, Fleming; Winters, Ky., and various other mines and points.

Tariff authority: Louisville & Nashville R. R. I. C. C. A-15961.

The lake rates on coal destined to upper lake ports during the season of 1928 are shown in the following extract from the annual report of the Lake Carriers' Association:

Contract rates on coal were also renewed without change from the low level fixed in 1924, as appended, with the usual allowance to the fast unloading plants for guaranteed dispatch:

	Per net ton
To principal ports on Lake Superior	$0. 40
To principal docks at Milwaukee	. 50
To principal docks at South Chicago and Indiana Harbor	. 50
To Georgian Bay	. 45

The differential rate to side ports on Lake Michigan, such as Manitowoc, Escanaba, Green Bay, and Sheboygan, was 45 cents per ton.

The lake coal moving from commercial docks at Duluth-Superior into the Northwest States meets with competition from the all-rail coal from producing districts in Illinois, Indiana, and western Kentucky. The lake coals largely control the territory in northern Michigan, Wisconsin, and Minnesota, but competition becomes sharper with all-rail coal from the Middle West as the freight differential in favor of the latter becomes more advantageous in the interior. The Middle Western and lake coals clash in southern Wisconsin and Minnesota. Minneapolis is an important center of the rail shippers into Northwest territory, many of the operators maintaining offices there and sending representatives out into the surrounding competitive country. The Iowa and North Dakota lignites are a factor in the local trade in some sections, and in eastern Montana the coals from that State and Wyoming shut off any further western extension.

The following tables show the all-rail rates from the principal producing and shipping points in the States of Illinois and Indiana to the same general destination territory served by the upper lake coal docks. There are also presented tables showing the all-rail rates on lake cargo coal from upper lake ports to points in the Northwest served by these ports.

TABLE No. 172.—*All rail rates on soft coal, carloads*

[In effect Nov. 1, 1929. In cents per ton of 2,000 pounds]

To	From Group 1, Herrin, Ill.		From Group 2, Murphysboro, Ill.		From Group 4, Conants and Cutler, Ill.	
	A	B	A	B	A	B
Aberdeen, S. Dak.[1]	474	431	474	431	464	421
Crookston, Minn	515	515	515	515	505	505
Des Moines, Iowa [1]	315	296	300	281	292½	273½
Duluth, Minn	405	405	405	405	395	395
Fargo, N. Dak.[2]	500	500	500	500	490	490
Minneapolis, Minn	375	356	375	356	365	346
Minnesota Transfer, Minn.						
Marshall, Minn	432	432	432	432	422	422
Rapid City, S. Dak.[1]	674	631	674	631	664	621
St. Paul, Minn	375	356	375	356	365	346
St. Cloud, Minn	401	401	401	401	391	391
Sioux City, Iowa	415	378	415	378	405	368
Sioux Falls, S. Dak.[2]	432	385	432	385	422	375
Watertown, S. Dak.[1]	432	393	432	393	422	383
Winona, Minn	335	335	335	335	325	325

[1] Chicago & North Western Ry. delivery.
[2] Chicago, Milwaukee, St. Paul & Pacific delivery.

A—Indicates rates apply on all grades of soft coal except mine run and except as provided under B.
B—Indicates rates apply on coal which has been passed through a bar screen not exceeding 1½ inches between bars, or its equivalent, a 2-inch mesh or a 2-inch round perforation.
Tariff authority: Missouri Pacific R. R. Co. I. C. C. A-7461.

TABLE No. 173.—*All rail rates on coal, carloads from Illinois groups as shown below*

[In effect Nov. 1, 1929. In cents per ton of 2,000 pounds]

To	From Group 1.		From Group 2	
	A	B	A	B
Aberdeen, S. Dak.[1]	464	421	474	431
Chicago, Ill.[2]	175	175	185	185
Crookston, Minn.[3]	505	505	515	515
Duluth, Minn.[3]	395	395	405	405
Des Moines, Iowa [4]	314½	296	337	324
Kansas City, Mo.[4]	298	291	338	326
Madison, Wis.[1]	265	265	275	275
Marshall, Minn.[1]	375	351	385	361
Minneapolis, Minn.[4]	365	346	375	356
Minnesota Transfer, Minn.[4]				
Omaha, Nebr.[4]	332	296	362	326
Pierre, S. Dak.[1]	531	488	541	498
Prairie du Chien, Wis.[4]	307	307	317	317
Rapid City, S. Dak.[1]	664	621	674	631
Sioux City, Iowa [4]	405	368	415	378
Sioux Falls, S. Dak.[5]	422	375	432	385
St. Cloud, Minn.[3]	391	391	401	401
St. Paul, Minn.[4]	365	346	375	356
Winona, Minn.[1]	325	325	335	335
Watertown, S. Dak.[1]	422	383	432	393

[1] C. & N. W. R. R. delivery.
[2] Proportional rate.
[3] Great Northern R. R. delivery.
[4] C. B. & I. R. R. delivery.
[5] C. R. I. & P. R. R. delivery.

A—Applies on lump, egg, nut and mine run coal.
B—Applies on pea, slack coal and screenings.
Group 1.—Includes Nashville, Belleville, French Village and various mines in Illinois.
Group 2.—Includes Eldorado, Grayson, Equality, Humbert and Mount Vernon, Ill.
Tariff authority: L. & N. R. R. I. C. C. 15844.

TABLE NO. 174.—*All-rail rates on bituminous coal, carloads, from groups in State of Illinois*

[In effect Nov. 2, 1929. In cents per ton of 2,000 pounds]

To	Group 1		Group 2		Group 3		Group 4	
	A	B	A	B	A	B	A	B
Aberdeen, S. Dak.[1]	464	421	464	421	474	431	444	401
Crookston, Minn.[2]	505	505	505	505				
Des Moines, Iowa [1]	357	316	357	316	367	326	337	296
Duluth, Minn.[2]	395	395	395	395				
Fountain City, Wis.[3]	345	326					325	306
Grand Island, Nebr.[3]	495	495						
Kansas City, Mo.[3]	315½	291	328	311				
Minneapolis, Minn.[4]	365	346	365	346	375	356	345	326
Marshall, Minn.[1]	375	351	375	351	385	361	355	331
Madison, Wis.[1]	265	265	265	265	275	275	245	245
Omaha, Nebr.[1]	332	296	332	296	362	326	332	296
Pierre, S. Dak.[1]	531	488	531	488	541	498	511	468
Prairie du Chien, Wis.[3]	307	307					287	287
Rapid City, S. Dak.[1]	664	621	664	621	674	631	644	601
St. Cloud, Minn.[2]	391	391	391	391				
St. Paul, Minn.[4]	365	346	365	346	375	356	345	326
Sioux City, Iowa [1]	405	368	405	368	415	378	385	348
Sioux Falls, S. Dak.[4]	422	375	422	375	432	385	402	355
Watertown, S. Dak.[1]	422	383	422	383	432	393	402	363
Winona, Minn.[3]	325	325					305	305

[1] Chicago & Northwestern Ry.
[2] Great Northern Ry.
[3] Chicago Burlington & Quincy R.R.
[4] Chicago, St. Paul, Minneapolis & Omaha Ry.

A—Rates apply on all grades of bituminous coal except as provided under B below.

B—Rates apply on all bituminous coal which has been passed through a bar screen not exceeding ½ inch between bars or a 2-inch mesh screen or a 2-inch round perforation.

Group 1 includes Beckemeyer, Freeze, Carbon, Caseyville, Trenton, Furman, O'Fallon, and Lebanon, Ill.

Group 2 includes Odin, Salem, and Sandoval, Ill.

Group 3 includes Norris City, Ill.

Group 4 includes Edinburg, Pana, Pleasant Plains, Springfield, Taylorville, and Tower Hill, Ill.

Tariff authority: Baltimore & Ohio R. R. I. C. C. WL-9520.

This same general territory is served also, all rail, from mines in Pennsylvania, Virginia, West Virginia, Maryland, and Ohio. For comparative purposes these rates to points shown in above table are shown in following table.

TABLE NO. 175.—*All-rail rates on bituminous coal, carloads from groups in the States of Illinois and Indiana*

[In effect Nov. 4, 1925. In cents per ton of 2,000 pounds]

To	Group 1		Group 2		Group 3		Group 4		Group 5		Group 6		Group 7	
	Lump	Fine	Lump	Fine	Lump	Fine	Lump	Fine	Lump	Fine	Lump	Fine	Lump	Fine
St. Paul, Minn	345	326	345	326	345	326	355	336	365	346				
Minneapolis, Minn	345	326	345	326	345	326	355	336	365	346				
Crockston, Minn	505	505	505	505	505	505	515	515	505	505				
St. Cloud, Minn	391	391	391	391	391	391	401	401	391	391				
Duluth, Minn. (G. N. Ry.)	395	395	395	395	395	395	405	405	395	395				
Marshall, Minn. (G. N. Ry.)	422	422	422	422	422	422	432	432	422	422				
Winona, Minn. (C. & N. W. Ry.)	305	305	305	305	305	305	315	315	325	325	305	305	305	305
Des Moines, Iowa (C. R. I. & P. Ry.)	305	286	305	286	305	286	315	296	292½	273½	275	256	275	256
Sioux City, Iowa (C. & N. W. Ry.)	405	368	405	368	405	368	445	409	405	368	385	348	385	348
Sioux Falls, S. Dak. (C. M. St. P. & P. R. R.)	422	375	422	375	422	375	432	385	422	375				
Pierre, S. Dak. (C. & N. W. Ry.)	531	488	531	488	531	488	541	498	531	488	511	468	511	468
Watertown, S. Dak. (C. & N. W. Ry.)	422	383	422	383	422	383	432	393	422	383	402	363	402	363
Aberdeen, S. Dak. (G. N. Ry.)	464	421	464	421	464	421	474	431	464	421				
Rapid City, S. Dak. (C. & N. W. Ry.)	664	664	664	664	664	664	674	674	664	664	664	664	664	664
Omaha, Nebr. (C. &N. W. Ry.)	352	316	352	316	352	316	362	326	332	296	332	296	332	296
Kansas C., Mo. (C. R. I. & P. Ry.)	354	354	354	354	354	354	354	354	298	298				
Praire du Chien Wis. (C. M. St. P. & P.)	287	287	287	287	287	287	297	297	307	307	287	287	287	287
Madison, Wis. (C. & N. W. Ry.)	245	245	245	245	245	245	255	255	265	265	245	245	245	245
Chicago, Ill. (Penn. R. R.)	155	155	155	155	155	155	165	165	[1] 175 [3] 185	[1] 175 [3] 185			[1, 2] 155	[1, 2] 155

[1] Proportional rate applying on traffic destined to points beyond Chicago, Ill., where no through rates are in effect via Chicago, Ill.

[2] Chicago & Alton, R. R.

[3] Chicago rate, Wabash Ry. Groups 1, 2, and 3 include various stations in Brazil, Ind., district; Group 4, various stations in Linton, Ind., district; Group 5, various stations in Belleville, Ill., district; Group 6 and 7, stations in Springfield, Ill., district.

The above rates are published in accordance with opinions and findings of Interstate Commerce Commission in ex parte 74, Illinois coal cases; Lake Docket coal cases, and Illinois Coal Traffic Bureau Docket 12898.

Tariff authorities: Pennsylvania R. R. I. C. C.'s 17 and 18.

TABLE No. 176.—*Rail rates on soft coal in carload lots from Duluth, Minn., and Superior, Wis.*

[In effect Nov. 4, 1929. In cents per ton of 2,000 pounds]

To—	
Stillwater, Minn	[1] 182
Lindstrom, Minn	[1] 168
Moose Lake, Minn	102
Spirit Lake, Minn	85
Ashland, Wis	170
Anoka, Minn	182
Clear Lake, Minn	190
St. Cloud, Minn	175
Sauk Center, Minn	204
Starbuck, Minn	233
Wadena, Minn	190
Fergus Falls, Minn	226
Breckenridge, Minn	248
Wahpeton, N. Dak	248
Great Bend, N. Dak	261
Mooreton, N. Dak	255
Carthage, Minn	279
Crookston, Minn	261
Grand Forks, N. Dak	279
Herrick, N. Dak	310
Moorhead, Minn	261
Fargo, N. Dak	261
Streeter, N. Dak	340
Grand Rapids, N. Dak	310
Leeds, N. Dak	358
Eldridge, N. Dak	322
Bismarck, N. Dak	371
St. Paul, Minn	[1] 182
Minneapolis, Minn	[1] 182

Carload minimum weight on cars of 40,000 pounds marked capacity, the carload minimum is 40,000. Cars of over 40,000 capacity, 10 per cent less than marked capacity of car—except gondola cars—actual weight applies when loaded to full visible capacity.

These rates are subject to all terminal and other charges of parties to tariff.

Tariff authority: Northern Pacific Ry. Co. I. C. C., 8116.

TABLE No. 177.—*Rail rates on bituminous coal in carload lots from Milwaukee, Wis.; carload minimum 40,000, except as otherwise provided*

[In effect Nov. 5, 1929. In cents per ton of 2,000 pounds]

To—	
Stillwater, Minn	[2] 261
Spirit Lake, Minn	279
Breckenridge, Minn	401
Wahpeton, N. Dak	401
Moorhead, Minn	474
Fargo, N. Dak	420
Racine, Wis	100

[1] Rate on bituminous fine coal which has passed through screen not exceeding 1½ inches between bars, or 2-inch mesh, or a 2-inch round perforation, will be $1.65 per ton of 2,000 pounds—applicable on interstate traffic.

[2] On screenings and slack coal 244, ton of 2,000 pounds.

TABLE NO. 177.—*Rail rates on bituminous coal in carload lots from Milwaukee Wis.; carload minimum 40,000, except as otherwise provided*—Continued

To—	
Madison, Wis	158
Prairie du Chien, Wis	210
Portage, Wis	160
La Crosse, Wis	219
Fond du Lac, Wis	110
Dubuque, Iowa	[2] 208
St. Paul, Minn	[1] 261
Minneapolis, Minn	
Council Bluffs, Iowa	352
Omaha, Nebr	352
Bettendorf, Iowa	195
Des Moines, Iowa	286
Cedar Falls, Iowa	261
Ottumwa, Iowa	261
Muscatine, Iowa	195
Kansas City, Mo	352
Mason City, Iowa	[1] 261
Sioux City, Iowa	359
Pipestone, Minn	322
Yankton, S. Dak	383
Rapid City, S. Dak	583
Leavenworth, Kans	352
Burlington, Iowa	233

Tariff authority: Chicago, Milwaukee, St. Paul & Pacific I. C. C., B–5726, Chicago & North Western I. C. C., 9180.

TABLE NO. 178.—*Rail rates on bituminous coal in carload lots (long haul) from groups and districts in Ohio*

[In effect Nov. 5, 1929. In cents per ton of 2,000 pounds]

To	Groups						
	1	2	3	4	5	6	7
Detroit, Mich.[a]	210	210	200	210	200	185	210
St. Louis, Mo.[b]	347	347	347	287			
Chicago, Ill.[b]	274	274	264	274	264 • 259	• 249	274
Saginaw, Mich.[c]	275	275	265	275	265	250	275
Milwaukee, Wis.[c d]	274	274	264	274	264	249	274

[a] Michigan Central delivery.
[b] Baltimore & Ohio delivery.
[c] Grand Trunk delivery.
[d] Applies on traffic for beyond via car ferry.
• Rate applies from Akron division, Baltimore & Ohio mines only.

The above groups include the following districts:
Group 1 includes St. Clairsville No. 8, Wheeling Creek No. 8, Cambridge, Pittsburgh No. 8, Ohio, and No. 8.
Group 2 includes Shawnee, Hocking, and Pomeroy.
Group 3 includes Crooksville.
Group 4 includes Jackson County.
Group 5 includes Middle and Coshocton.
Group 6 includes Massillon and Deerfield.
Group 7 includes Leetonia (various Pennsylvania mines and points)
The various mines in these districts are shown in detail in the tariff named.
Tariff authority: Agent F. V. Davis I. C. C. 47.

[1] On screenings and slack coal 244, ton of 2,000 pounds.
[2] When originating east of Indiana-Ohio State line rate is $2.02 per ton of 2,000 pounds.

VIII. OTHER BULK FREIGHT

In addition to iron ore, coal, and grain, the bulk commodities of importance carried on the Great Lakes are stone, sand and gravel, lumber, and petroleum. Of these, stone is the most important in tonnage and the others follow in the order named. Together they comprised about 16.3 per cent of the total lake traffic in 1928.

STONE

The stone traffic on the Great Lakes has grown apace with the movement of iron ore. By far the largest part of this trade is limestone, most of which is destined to smelters for use in making iron and steel. The remainder consists of crushed stone for road building or for concrete aggregate, rubble, and riprap for breakwaters, etc.

With the exception of about 1,175,000 tons, practically all of the stone shipped on the Lakes in 1928 originated on the lower peninsula of Michigan. Calcite, Rockport, and Alpena, Mich., shipped 14,028,847 short tons of stone to various ports on the Great Lakes. Of this amount Calcite shipped 11,087,471 tons, Rockport 1,985,502 tons, and Alpena 955,874 tons. Other shipping ports of importance were Sturgeon Bay, Wis.; Sandusky, Ohio; and Kelleys Island, Ohio. The first shipped 470,741 tons, most of which went to Lake Michigan ports. Sandusky shipped 308,750 tons and Kelleys Island 280,345 tons, all of which was delivered to Lake Erie ports.

Chicago, Ill., took 2,779,762 tons, the largest amount of stone received at any port during 1928. Buffalo, N. Y., and Buffington Harbor, Ind., were second and third, respectively, the former receiving 1,750,208 tons and the latter 1,682,820 tons. Other important receiving ports were Gary, Ind., with 1,350,328 tons, and Indiana Harbor, Ind., with 1,236,000 tons, Fairport, Ohio, with 1,082,665 tons, and Cleveland, Ohio, with 1,025,821 tons.

At the larger ports, stone is handled in a manner similar to coal and iron ore, being carried along conveyors to the stock pile, then through hoppers to movable conveyors which deposit it in the ships. The average time for loading is four and one-half hours.

In the last few years, the unloading facilities have been augmented by the construction of the self-unloading vessel. These ships are equipped with elevators to bring the stone up out of the holds and load it onto the belt conveyors which carry the material into the storage yard. The average capacity for vessels of this type is about 15,000

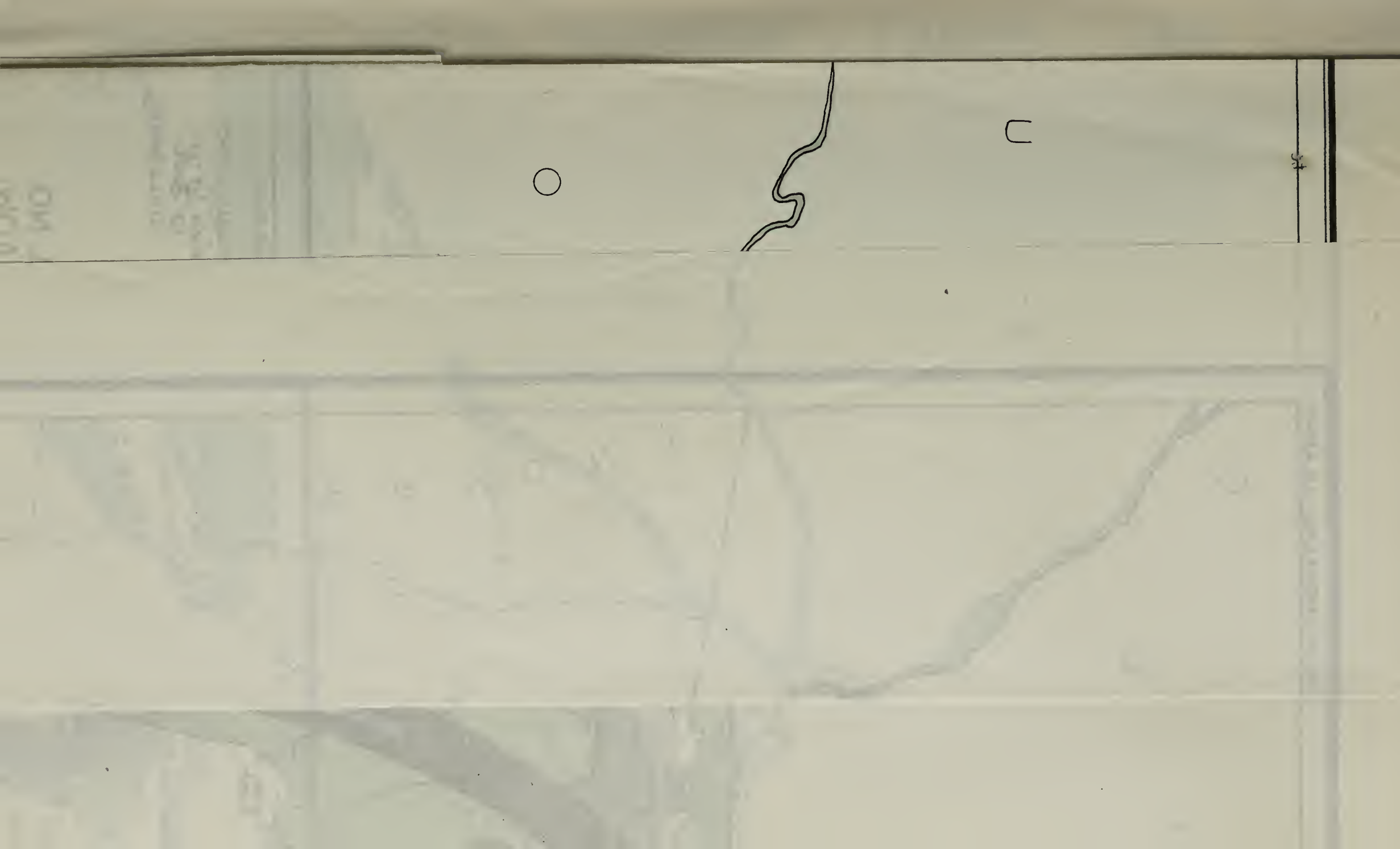
tons and they can unload themselves at about the rate of a ton a second. The more important receiving ports also use the unloading machines. The modern type are equipped with clam-shell buckets which are attached to movable bridges and can be manipulated at any point on the dock.

At Buffington Harbor, Ind., a privately constructed and operated harbor on Lake Michigan is devoted solely to the receipt and shipment of stone. This well-protected harbor has the unique feature of providing at the same time facilities both for unloading limestone from the quarries and for loading cement for shipment by water to all ports on the Great Lakes. With its ample docking space, a standard lake bulk freighter holding 12,000 tons can readily be unloaded by the overhead bridge, while at the same time a self-unloading boat can automatically discharge a cargo also of 12,000 tons each.

The following chart and tables show the movement of stone on the Great Lakes during 1928 and by years from 1919 to 1928, inclusive. The latter table was compiled from statistics published by the Lake Carriers Association.

TABLE No. 179.—*Stone movement 1928, by ports*

Shipping ports	Short tons	Receiving ports	Short tons
Calcite	11,087,471	Duluth-Superior	415,003
Rockport	1,985,502	Sault Ste. Marie	186,449
Alpena	955,874	Cheboygan	450
Marblehead	84,544	Saginaw	186,753
Kelleys Island	280,345	Harbor Beach	11,314
Frankfort	574	Port Huron	247,746
Chicago	21,900	Detroit	773,616
Sandusky	308,750	Rouge River	720,127
Alexandria Bay	8,500	Wyandotte	955,874
Sturgeon Bay	470,741	Put-in-Bay	258
Not separately reported	648,484	Marblehead	4,658
		Manistique Harbor	1,003
		Menominee Harbor	83,689
		Green Bay	10,000
		Algoma	903
		Two Rivers Harbor	5,880
		Manitowoc	261,804
		Sheboygan	562
		Port Washington	440
		Milwaukee	290,621
		Racine	5,092
		St. Joseph Harbor	2,000
		South Haven	2,564
		Saugatuck Harbor	1,048
		Grand Haven Harbor	500
		Muskegon	58,244
		White Lake Harbor	1,056
		Ludington	2,070
		Frankfort	3,510
		Manistee	7,499
		Portage Lake	400
		Chicago	2,779,762
		Indiana Harbor	1,236,000
		Gary	1,350,328
		Buffington Harbor	1,682,820
		Huron Harbor	9,488
		Lorain	593,783
		Cleveland	1,025,821
		Fairport	1,082,665
		Conneaut	1,250
		Erie	57,194
		Buffalo	1,750,208
		Tonawanda	39,551
		Oswego	2,682
Total	15,852,685	Total	15,852,685



WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

MOVEMENT OF STONE ON THE GREAT LAKES 1928

Quantities in short tons

Scale: 0 5 10 Mil. Tons

SUBMITTED:

W. E. Graves

CHIEF STATISTICIAN

Data by J.J.L.

APPROVED:

J. J. Loring

LT. COL. CORPS OF ENGINEERS, U.S.A.

Drawn by O.L.A. & T.F.P.

WILLIAMS & HEINTZ CO., WASH., D.C.

TABLE No. 180.—*Stone traffic on Great Lakes, 1919–1928*

Year	Short tons	Year	Short tons
1919	6,407,285	1924	9,225,624
1920	7,821,980	1925	11,351,948
1921	3,925,705	1926	12,628,244
1922	7,592,137	1927	14,033,376
1923	9,920,422	1928	15,677,551

FOREST PRODUCTS

The traffic in lumber and other forest products was at one time one of the more important movements on the Great Lakes, but as the area tributary to the Lakes has been stripped of its more valuable timber this movement has dwindled. The trend is well indicated by the following table showing the movement of lumber through St. Marys Falls Canal during the period 1884–1928, inclusive:

TABLE No. 181.—*Movement of lumber through St. Mary's Falls Canals 1884–1928, inclusive*

Year	Short tons	Year	Short tons	Year	Short tons
1884	244,778	1899	2,076,114	1914	904,296
1885	255,968	1900	1,819,302	1915	912,902
1886	277,376	1901	2,144,248	1916	682,704
1887	330,452	1902	2,182,942	1917	701,218
1888	480,744	1903	2,006,384	1918	593,838
1889	631,108	1904	1,846,560	1919	488,852
1890	723,858	1905	1,933,602	1920	385,708
1891	732,610	1906	1,801,262	1921	412,612
1892	1,025,688	1907	1,398,640	1922	488,224
1893	1,177,090	1908	906,522	1923	378,674
1894	1,445,576	1909	1,104,760	1924	547,886
1895	1,481,400	1910	1,206,202	1925	372,972
1896	1,369,972	1911	1,117,026	1926	346,150
1897	1,610,224	1912	1,335,084	1927	305,216
1898	1,790,970	1913	1,199,172	1928	374,410

The domestic traffic consists of logs, poles, staves, shingles, etc., while wood pulp and pulpwood comprise the bulk of the imports.

During 1928 the total of forest products carried on the Lakes was 2,152,425 short tons, of which 1,163,035 tons were imports, 4,323 tons exports, while 985,067 tons represent the domestic movement. The following table shows receipts and shipments at each port:

TABLE No. 182.—*Movement of forest products, 1928, by ports*

[Quantities in short tons]

Port	Imports	Exports	Domestic receipts	Domestic shipments	Total
Grand Marais			530	49	579
Agate Bay				10,034	10,034
Duluth-Superior			5,679	43,404	49,083
Ashland	120,000		21,274		141,274
Ontonagon			5,887		5,887
Keweennaw Waterway		4,173		20,532	24,705
Munising	23,842				23,842
Pequaming				8,925	8,925
L'Anse				23,642	23,642

TABLE NO. 182.—*Movement of forest products, 1928, by ports*—Continued

[Quantities in short tons]

Port	Imports	Exports	Domestic receipts	Domestic shipments	Total
Braga Harbor				1,787	1,787
Manistique				64,191	64,191
Menominee	7,154		1,023	111,196	119,373
Green Bay	11,306		20,492		31,798
Sturgeon Bay			173	644	817
Kewaunee			60	70,666	70,726
Two Harbors			40		40
Manitowoc	3,268			232,438	235,706
Port Washington			60		60
Milwaukee	6,391	150	15,647	198,688	220,876
Holland	1,579			2,229	3,808
Muskegon	61,067		42,567	728	104,362
Manistee	3,935		24,503		28,438
Charlevoix			315		315
Traverse City			60		60
Gladstone			326	252	578
Petoskey			3,866		3,896
Escanaba			2,805	6,106	8,911
Chicago	63,210		11,000		74,210
Alpena			7,600		7,600
Saginaw	14,923		4,936		19,859
Port Huron	56,697		730		57,427
Detroit	6,858		350		7,208
Rouge River	83,407		39,809		123,216
Toledo	767				767
Cleveland	9,705		29	627	10,361
Erie	146,924		6,974		153,898
Buffalo			27,399	3,273	30,672
Tonawanda	43,018		14,810		57,828
Ogdensburg	208,881		49,051		257,932
Alexandria Bay	50				50
Waddington	137,008				137,080
Grand Haven Harbor			119,756	15,291	135,047
Luddington Harbor			300,510		300,510
Frankfort			251,889		251,889
Rochester Harbor	144,401				144,401
Not separately reported	6,764		4,884	2,746	14,394
Total	1,163,035	4,323	985,067	825,810	2,978,235

PETROLEUM MOVEMENT

Commerce in petroleum products originates at Indiana Harbor, Ind. The crude oil is received at this port from the oil fields, almost exclusively through pipe lines and after undergoing the process of refining is shipped in tankers to the various receiving ports.

As previously stated Indiana Harbor is the source of the petroleum movement on the Lakes. During the year 1928, 977,203 tons, or 83 per cent of the total petroleum shipped on the Great Lakes, originated at this port. Buffalo and Oswego were the other important shipping ports with 144,699 tons and 32,490 tons, respectively.

Rouge River was the principal receiving point, 551,947 tons, or 45 per cent of the total petroleum receipts arriving at this port during the year 1928. Other important receiving ports were Duluth-Superior, with 179,390 tons, or 15 per cent; Muskegon, 166,247 tons, or 14 per cent; Chicago, with 79,669 tons, or 7 per cent; Saginaw, 79,084 tons, or 7 per cent; and Green Bay, 65,284 tons, or 5 per cent.

TABLE No. 183.—*Movement of petroleum on the Lakes, 1928*

[Quantities in short tons]

Port	Imports	Exports	Domestic receipts	Domestic shipments	Total
Grand Marais Harbor			1,163		1,163
Duluth-Superior			179,390	1,413	180,803
Saginaw River			79,084		79,084
Rouge River	6,646		545,301		551,947
Toledo		14,459			14,459
Muskegon			166,247		166,247
Chicago			79,669	2,669	82,338
Indiana Harbor				977,203	977,203
Charlevoix				141	141
Green Bay			65,284		65,284
Buffalo	13,144	96,093	15,853	48,603	173,693
Oswego			35,159	32,490	67,649
Ogdensburg			11,002		11,002
Sacket Harbor		2,513	14,889		17,402
Rochester		27			27
Clayton		31	4,465		4,496
Alexandria Bay		70			70
Cleveland		27	575	4,657	5,259
Erie				3,872	3,872
Other ports, not separately reported			792		792
Total	19,790	113,220	1,198,873	1,071,048	2,402,931

SAND AND GRAVEL

Although sand and gravel rank second in volume to stone, practically the entire traffic is local, originating in most cases but a few miles from its ultimate destination. The imports of sand and gravel are confined almost entirely to ports on Lake Erie, which receive large quantities from the Canadian side of the lake. The table following shows the movement of sand and gravel by ports during 1928:

TABLE No. 184.—*Movement of sand and gravel on the Great Lakes, 1928*

[Quantities in short tons]

Port	Imports	Exports	Domestic receipts	Domestic shipments	Total
Grand Marais				70,669	70,669
Duluth-Superior			205,428	2,600	208,028
Ashland			5,000		5,000
Tonawanda Bay			118,888		118,888
Keweenaw Waterway	4,750		1,080		5,830
Baudette					
Menominee			13,750		13,750
Rochester, N. Y			28,000		28,000
Milwaukee			190,793		190,793
Kenosha			7,700		7,700
Little Sodus Bay			6,250		6,250
Oswego, N. Y	448		20,000		20,448
Holland			7,336		7,336
Muskegon			96,266	125,591	221,857
Cape Vincent Harbor	3,070				3,070
Wyandotte	87,913		30,176		118,089
Saginaw River			24,186		24,186
Port Huron			127,818		127,818
Detroit	214,390	73,560	1,391,875		1,679,825
Rouge River	107,195		373,685		480,880
Toledo			412,978		412,978
Port Clinton			4,500		4,500
Sandusky	103,138		358,900	69,950	531,988
Lorain			208,475		208,475
Cleveland	141,469		188,789		330,258
Erie			169,909		169,909
Dunkirk			23,436		23,436
Buffalo		14,126	1,628,258	2,436	1,644,820
Niagara River			113,655		113,655

TABLE No. 184.—*Movement of sand and gravel on the Great Lakes, 1928*—Con.

[Quantities in short tons]

Port	Imports	Exports	Domestic receipts	Domestic shipments	Total
Clayton, N. Y.			500		500
Alexandria Bay	800				800
Green Bay			13,200		13,200
Green Bay Harbor			2,000		2,000
Fox River			906	47,485	48,391
Grand Haven			4,778	186,622	191,400
Grand River			323,539		323,539
Ludington Harbor			11,904		11,904
Manistee Harbor			7,796		7,796
Chicago	110,220	450	182,506	1,697,054	1,990,230
Port Crescent		23,765		448,671	472,436
Harbor Beach			9,820		9,820
Ports not separately reported		2,135	10,949	6,217	19,301
Total	773,393	114,036	6,325,029	2,657,295	9,869,753

The following table has been prepared to show the movement of sand and gravel, petroleum, and lumber (including pulpwood) during the last 10 years for which figures are available. It will be noted that the receipts and shipments do not balance. This is due to several causes. Sand and gravel dredged from river or lake bottoms are recorded only as receipts. Lumber is moved from numerous small places where no record of shipments are kept, and in such cases is recorded only when it is received at some lake port. The reported receipts of these commodities, therefore, indicate the volume of the traffic more accurately than the reported shipments.

TABLE No. 185.—*Receipts and shipments of sand and gravel, petroleum, and lumber, 1919 to 1928, inclusive*

[Quantities in short tons]

Year	Sand and gravel				Petroleum (bulk)				Lumber (including pulp wood, logs, poles, etc.)			
	Foreign		Domestic		Foreign		Domestic		Foreign		Domestic	
	Imports	Exports	Receipts	Shipments	Imports	Exports	Receipts	Shipments	Imports	Exports	Receipts	Shipments
1919			2,465,303	216,092			420,660	724,812			770,946	241,817
1920	612,826	925	2,826,195	114,186		88,370	451,535	663,804	303,596	6,074	229,297	287,735
1921	354,838	2,075	2,559,596	557,534		49,053	484,081	691,390	560,398	1,471	523,571	175,754
1922	441,763	65,653	2,950,372	37,897		37,492	635,659	567,389	503,230	9,157	478,252	221,488
1923	686,130		3,771,160	159,006		38,913	790,070	748,535	595,036	6,789	300,628	123,815
1924	433,672	300	4,629,093	246,552		174	910,428	711,229	723,229	2,488	817,425	845,476
1925	1,018,689	2,682	6,372,312	1,042,739		145	794,413	930,468	1,098,139	2,357	1,196,411	900,751
1926	453,167	7,575	6,636,691	348,317			763,943	920,361	1,006,000	5,746	997,775	552,392
1927	676,935		6,142,573	720,351		110	1,029,388	974,041	1,255,046	1,481	893,585	757,350
1928	773,393	114,036	6,325,029	2,657,295		2,650	1,112,035	1,062,629	1,163,035	4,323	985,067	825,810

IX. PACKAGE FREIGHT

PRINCIPAL PACKAGE-FREIGHT PORTS

Miscellaneous general freight, not included in the commodities specifically mentioned elsewhere and generally termed "package freight," embraces a large variety of articles. The movement of this class of freight aggregated 4,000,000 short tons in 1928 and constituted about 3 per cent of the total lake trade.

Although approximately 110 improved harbors, together with a greater number of unimproved and private harbors, participated in this movement, the greater share is confined to a few of the more important lake ports.

Alpena, Mich., was the most important shipping port, having forwarded 621,672 tons during 1928. Duluth-Superior and Buffalo rank next in order with 613,616 tons and 472,613 tons, respectively.

Milwaukee's shipments, aggregating 445,261 tons, were fourth in volume. Detroit, Cleveland, and Chicago followed in the order named with 410,871 tons, 366,023 tons, and 322,174 tons, respectively.

Buffalo was the principal receiving port during 1928, its inbound business amounting to 832,083 tons. Other important receiving ports were Detroit, with 663,150 tons; Milwaukee, 504,186 tons; Duluth-Superior, 455,103 tons; and Chicago, with 418,274 tons. These five ports accounted for about 73 per cent of the total receipts of lake package freight.

The following table gives a résumé of the traffic in package freight on each of the Great Lakes for 1928:

TABLE No. 186.—*Package-freight traffic of the Great Lakes during the year 1928*[1]

[Amounts in short tons]

Lake	Domestic freight traffic			Foreign freight traffic		
	Receipts	Shipments	Total	Imports	Exports	Total
Erie	2,021,867	1,401,072	3,422,939	48,233	71,947	120,180
Michigan	1,241,509	1,085,623	2,327,132	96,369	112,744	209,113
Superior	479,139	671,249	1,150,388	6,221	20,250	26,471
Huron	104,714	735,906	840,620	3,873	640	4,513
Ontario	75,521	97,838	173,359	672	55,866	56,538
Total	3,922,750	3,991,688	7,914,438	155,368	261,447	416,815

[1] Car-ferry traffic not included.

The following tables show the package-freight traffic of United States ports during each of the five years, 1924 to 1928, inclusive. The figures show that during this period sugar was the most important

import, from point of tonnage, while manufactured iron and steel led the exports. In the domestic trade, flour, cement, lime, manufactured iron and steel, and automobiles led in the order named.

The average annual imports during the 5-year period were 128,922 tons; exports, 191,659 tons; domestic receipts, 3,241,490 tons; and domestic shipments, 3,034,481 tons. Eliminating the duplication resulting from the addition of domestic receipts and shipments, the net average package freight of United States ports on the Great Lakes during the period considered is found to be 3,458,566 tons.

TABLE No. 187.—*Package freight of United States Great Lakes ports, 1924 to 1928, inclusive*

[Amounts in short tons]

FOREIGN COMMERCE

Commodity	1928	1927	1926	1925	1924	Annual average
IMPORTS						
Automobiles					7	1
Sugar	5,269	19,447	21,063	28,629		14,882
Fish	5,583	2,723	2,183	2,161	3,625	3,255
Fruits and vegetables		25	21	4,194	15	851
Livestock	280	236	177	306	318	263
Manufactured iron and steel	18,278	7,768	4,576	13,095	627	8,869
Pig iron	6,200		8,412			2,922
Unclassified	119,758	123,385	107,343	83,019	55,887	97,878
Total	155,368	153,584	143,775	131,404	60,479	128,922
EXPORTS						
Copper			3,019	6,431		1,890
Automobiles	4,268	794		16,078	1,645	4,557
Sugar	54,928	14,929	7,983	11,311	3,681	18,566
Fish	30		11			8
Flour	20,623	57,279	47,749	35	27,973	30,732
Salt		1,990			1,000	598
Fruits and vegetables	75	60		144		56
Livestock				13	3	3
Manufactured iron and steel	165,916	122,856	164,591	117,640	5,495	115,300
Pig iron	2,258	3,339			2,240	967
Unclassified	13,349	16,059	19,507	27,142	18,849	18,981
Total	261,447	214,306	242,860	178,794	60,886	191,659

DOMESTIC COMMERCE

Commodity	1924	1925	1926	1927	1928	Annual average
RECEIPTS						
Cement, lime, etc	261,695	408,164	208,479	655,048	713,887	449,455
Copper	61,587	58,432	40,957	53,682	41,370	51,206
Automobiles	131,623	191,146	209,036	354,150	273,210	231,833
Sugar	29,066	32,394	77,937	152,492	279,227	114,223
Fish	22,628	24,860	29,903	25,997	22,462	25,170
Flour	644,528	528,565	566,617	679,450	634,234	610,679
Salt	105,010	164,991	143,091	116,155	143,685	134,586
Fruits and vegetables	29,475	62,531	57,632	47,826	59,982	51,489
Livestock		12	56	31		20
Manufactured iron and steel	31,060	292,723	259,723	323,751	438,706	269,173
Pig iron	23,238	14,425	108,930	125,486	109,665	76,349
Unclassified	1,012,912	1,648,502	1,125,122	1,143,681	1,206,322	1,227,308
Total	2,352,822	3,426,647	2,827,483	3,677,749	3,922,750	3,241,490

TABLE No. 187.—*Package freight of United States Great Lakes ports, 1924 to 1928, inclusive*—Continued

[Amounts in short tons]

DOMESTIC COMMERCE—Continued

Commodity	1924	1925	1926	1927	1928	Annual average
SHIPMENTS						
Cement, lime, etc	1,910	432,103	12,019	646,179	754,326	369,307
Copper	837	57,692	56,737	64,041	71,409	50,143
Automobiles	113,919	162,448	233,425	238,632	325,822	214,849
Sugar	67,336	57,576	87,845	131,871	111,246	91,175
Fish	462	639	1,693	612	814	844
Flour	163,547	686,473	721,518	771,281	846,418	537,847
Salt	141,232	68,467	146,658	110,256	121,821	117,687
Fruits and vegetables	88,005	35,220	45,926	61,604	36,511	53,453
Livestock	628	44	62	90		165
Manufactured iron and steel	132,239	219,698	358,914	458,351	396,502	313,141
Pig iron	5,000	40,929	51,904	171,635	233,061	100,506
Unclassified	1,090,008	1,198,851	971,392	1,072,807	1,093,758	1,085,363
Total	1,805,123	2,960,140	2,688,093	3,727,359	3,991,688	3,034,481

SUMMARY

Calendar year	Grand total (adjusted)	Foreign			Domestic			Total (adjusted)[1]
		Imports	Exports	Total	Receipts	Shipments	Total	
1924	2,200,337	60,479	60,886	121,365	2,352,822	1,805,123	4,157,945	2,078,972
1925	3,503,592	131,404	178,794	310,198	3,426,647	2,960,140	6,386,787	3,193,394
1926	3,144,423	143,775	242,860	386,635	2,827,483	2,688,093	5,515,576	2,757,788
1927	4,070,444	153,584	214,306	367,890	3,677,749	3,727,359	7,405,108	3,702,554
1928	4,374,034	155,368	261,447	416,815	3,922,750	3,991,688	7,914,438	3,957,219
Annual average	3,458,566	128,922	191,659	320,581	3,241,490	3,034,481	6,275,971	3,137,985

[1] Domestic commerce has been adjusted by discounting half of the total, for the reason that receipts duplicate shipments, or vice versa. Shipments are less than receipts because of the movement from minor ports, for which no statistics are available.

LAKE ERIE, LAKE ST. CLAIR, AND CONNECTING RIVERS

This group of ports ranks first among the Great Lakes in the volume of domestic package freight handled in 1928. Buffalo alone handled 38 per cent of the total domestic package freight tonnage of this district and led all the other ports on the Lakes. Its position is due to its importance as a transshipment medium between the lake carriers on the west and the New York State Barge Canal and railroads connecting the port with the Atlantic seaboard and intermediate territory on the east. Detroit, Cleveland, and Rouge River rank next in order among Lake Erie ports with 31, 19, and 5 per cent, respectively, of the total annual traffic of this region.

Flour was the principal article of package freight received at Buffalo and during 1928 amounted to 484,360 tons, or about 70 per cent of the total inbound package freight tonnage. Chief among the other commodities received were miscellaneous commodities, 96,230 tons, or about 14 per cent of the total; automobiles, 58,524 tons or about 8 per cent; and fruit and vegetables, 43,142 tons, or about 6 per cent.

Buffalo's outbound commerce in package freight amounted to about 34 per cent of the total shipments from the ports of the Lake Erie group. Miscellaneous merchandise was the principal commodity handled and amounted to 156,225 tons, or 48 per cent of the shipments. Sugar and sirup, 91,716 tons, or 28 per cent; pig iron, 28,974 tons, or 9 per cent; automobiles, 23,031 tons, or 7 per cent; and iron and steel manufactures, 13,488 tons, or 4 per cent, followed in the order named. The remaining 4 per cent of this trade was composed of fruit and vegetables, copper, cement, flour, salt, and fish.

In addition to the lake tonnage of the port, there were handled during 1928, 295,446 tons of package freight to and from the New York State Barge Canal. Receipts from the canal totaled 136,049 tons. Sugar, amounting to 81,098 tons, or 59 per cent of the total, was the leading article of this commerce. Other commodities prominent in the traffic were miscellaneous merchandise, 24,134 tons, or 18 per cent; salt, 10,655 tons, or 8 per cent; manufactured iron and steel, 9,384 tons, or 7 per cent; copper, 8,633 tons, or 6 per cent; and pig iron 2,145 tons, or 2 per cent.

Shipments via New York State Barge Canal totaled 146,311 short tons. Pig iron amounting to 119,308 tons constituted over 82 per cent of these shipments. Miscellaneous package freight ranked second with 15,024 tons, or 10 per cent of the total, while manufactured iron and steel with 9,778 tons, or 7 per cent, was next in importance. At Detroit the principal commodity of inbound commerce was cement which amounted to 340,062 tons or about 51 per cent of the total. The remainder consisted of miscellaneous merchandise, with 133,716 tons, or 20 per cent; manufactured iron and steel with 110,189 tons, or 17 per cent and some sugar, copper, automobiles and foodstuffs.

The principal articles of package shipments from Detroit were automobiles which amounted to 234,860 tons, or 57 per cent of the total, with miscellaneous merchandise making up the balance.

Automobiles and trucks amounting to 96,672 tons, or about 35 per cent of the total, rank first in the receipts at Cleveland. Other commodities prominent in this traffic were manufactured iron and steel, cement, and miscellaneous merchandise, amounting to 25, 20, and 18 per cent, respectively. The principal articles in the outbound trade were iron and steel manufactures which amounted to 150,261 tons, or 41 per cent of the total and miscellaneous merchandise, 134,978 tons, or 37 per cent of the total. The balance consisted chiefly of pig iron, automobiles and petroleum products.

Iron and steel manufactures aggregating 60,757 tons, or 50 per cent of the total inbound package freight was the principal commodity received at Rouge River. Pig iron ranked second with 59,544 tons, or 49 per cent.

Rouge River's package freight shipments amounted to 50,722 tons and were composed of rock salt with 45,016 tons, or 89 per cent, and manufactured steel with 5,706 tons, or 11 per cent.

Flour to the amount of 58,456 tons, or 88 per cent of the total inbound package freight, was the principal commodity received at Erie. The remainder consisted of foodstuffs, miscellaneous merchandise, iron and steel manufactures, and fish.

Erie's package freight shipments were mostly miscellaneous articles which reached a total of 29,876 tons, or 54 per cent of the shipments. Sugar and sirup amounted to 12,545 tons, or 22 per cent, and foodstuffs 6,846 tons, or 12 per cent. The remaining 12 per cent of this traffic was chiefly iron and steel manufactures.

The inbound package freight of Toledo is composed principally of unclassified general merchandise. Shipments from this port consisted of automobiles amounting to 17,162 tons, or about 56 per cent of the total, and miscellaneous merchandise. Among the smaller ports within this group, practically the entire inbound commerce of Dunkirk, Huron, Lorain, Port Clinton, and Vermilion consisted of fresh fish caught locally and consumed in the respective immediate territories. Only a very small portion of this class of commodity finds outside markets through lake carriers. It will be noted from the tables that none of the above named ports is credited with shipments in the package freight movement. Salt constituted about 90 per cent of the receipts at Niagara River, the balance being sugar. There were no shipments at the port. At Fairport 20,500 tons of flour comprised the inbound movement while sugar, foodstuffs, and miscellaneous merchandise made up the outbound traffic. Fresh fish accounted for 2,864 tons, or 69 per cent of Sandusky's domestic receipts, the remaining 31 per cent being composed of miscellaneous merchandise; the shipments were made up entirely of miscellaneous merchandise.

TABLE NO. 188.—*Package freight movement on Lake Erie, calendar year 1928*

[Quantities in short tons]

Ports	Domestic package freight			Foreign package freight		
	Receipts	Shipments	Total	Imports	Exports	Total
Ashtabula, Ohio	2,135		2,135			
Buffalo, N. Y	832,083	472,613	1,304,696	9,698	35,486	45,184
Cleveland, Ohio	276,008	366,023	642,031		5,185	5,185
Detroit, Mich	663,150	410,871	1,074,021	38,063	14,183	52,246
Dunkirk, N. Y	46		46			
Erie, Pa	66,427	55,225	121,652	53		53
Fairport, Ohio	20,500	9,130	29,630			
Huron, Ohio	731		731			
Kellys Island, Ohio	766	427	1,193			
Lorain, Ohio	5,854		5,854		9,885	9,885
Middle Bass Island, Ohio	270	608	878			
Niagara River, N. Y	15,742		15,742			
North Bass Island, Ohio	272	113	385			
Port Clinton, Ohio	1,371		1,371			
Put-in-Bay, Ohio	1,309	779	2,088			
Rouge River, Mich	122,098	50,722	172,820		6,875	6,875
Sandusky, Ohio	4,128	2,321	6,449	419	333	752
Toledo, Ohio	8,441	30,662	39,103			
Tonawanda, N. Y		1,578	1,578			
Vermilion, Ohio	536		536			
Total	2,021,867	1,401,072	3,422,939	48,233	71,947	120,180

LAKE MICHIGAN AND CONNECTING WATERS

During 1928 the tonnage of package freight carried on Lake Michigan ranked second in volume among the Great Lake ports. Milwaukee and Chicago were the principal ports in this area, ranking fourth and fifth, respectively, among the ports of the Great Lakes. Receipts of package freight at Milwaukee, exclusive of that shipped in by car ferries from the Michigan Peninsula, amounted to 504,186 tons. Miscellaneous package freight with 196,582 tons, or 39 per cent, was the principal commodity received, closely followed by cement with 194,510 tons, or 39 per cent. Sugar ranked next with 44,601 tons, or 9 per cent, and automobiles next with 29,511 tons, or 6 per cent. Chief among the remainder of the classified commodities were pig iron, 17,481 tons, and salt, 17,195 tons. Exclusive of car ferries, shipments of package freight from Milwaukee amounted to 445,261 tons, and consisted chiefly of flour, 243,097 tons, or 55 per cent of the total; miscellaneous package freight, 190,594 tons, or 43 per cent; and, automobiles, 11,326 tons, or 2 per cent.

Chicago's inbound package-freight was composed, for the most part, of miscellaneous products, which in 1928 amounted to 266,316 tons, or 64 per cent of the total. The most important classified commodities were salt, amounting to 54,660 tons, or 13 per cent of the total; sugar, 53,970 tons, or 13 per cent; and cement, 36,360 tons, or 9 per cent. In its outbound trade, miscellaneous package freight was the principal commodity, amounting to 157,277

tons, or 49 per cent of the total shipments; flour with 149,700 tons, or 46 per cent, was second; manufactured iron and steel made up the remaining 5 per cent of this trade. Chicago was first among the Great Lakes ports in the amount of its foreign freight traffic, having handled 134,499 tons, or about 32 per cent of the total for all Great Lakes ports. The principal commodity imported was miscellaneous package freight, 67,644 tons having been received. The balance of the import trade was composed of sugar, pig iron, and fish.

Iron and steel led in the exports, there having been shipped 55,791 tons. The remaining 217 tons of this trade were miscellaneous commodities.

Other important ports in this group were Indiana Harbor, Ludington, Manitowoc, and Muskegon. The package-freight of Ludington was principally devoted to the outbound trade, 88,956 tons, or 76 per cent of the total trade of the port being in this movement. Salt was the most important commodity shipped, 58,094 tons, or 66 per cent, leaving the port during 1928. Of the inbound traffic, miscellaneous package freight with 15,810 tons, or 55 per cent of the total, was the chief item.

Indiana Harbor handled 97,034 tons in 1928. Its receipts were chiefly iron and steel manufactures, amounting to 85,000 tons, or 90 per cent of the inbound trade; pig iron comprised the remaining 10 per cent of this movement. The outbound commerce of this port consisted of 2,191 tons of manufactured iron and steel products.

The principal article in Manitowoc's package-freight movement was cement. The shipments of this commodity in 1928 amounted to 73,890 tons, and comprised 81 per cent of the total movement of the port. Miscellaneous products received at this port amounted to 12,014 tons and accounted for the balance of the port's trade.

The package-freight of Muskegon consisted principally of manufactured articles. The chief articles of its receipts were supplies and machinery for its industries and general merchandise. In the outbound commerce manufactured articles composed of billiard tables, bowling alleys, shade rollers, and the like, comprised 17,729 tons, or 65 per cent, of the trade.

The package freight of the smaller ports on Lake Michigan is composed mainly of general merchandise.

TABLE NO. 189.—*Package-freight movement on Lake Michigan, calendar year 1928*

[Quantities in short tons]

Ports	Domestic package-freight traffic			Foreign package-freight traffic		
	Receipts	Shipments	Total	Imports	Exports	Total
Algoma, Wis	661		661			
Charlevoix, Mich	1,243	535	1,778			
Chicago, Ill	418,274	322,174	740,448	78,491	56,008	134,499
Escanaba, Mich	706	336	1,042			
Frankfort, Mich	636	565	1,201			
Gary, Ind					16,044	16,044
Grand Haven, Mich	26,731	25,833	52,564			
Green Bay, Wis	31,276	2,208	33,484			
Holland, Mich	11,014	21,654	32,668			
Indiana Harbor, Ind	94,843	2,191	97,034	2,000	29,308	31,308
Kenosha, Wis	9,832	18,258	28,090			
Kewaunee, Wis	1,875	608	2,483			
Ludington, Mich	28,654	88,956	117,610			
Manistee, Mich	3,522	4,654	8,176			
Manistique, Mich	209	10	219			
Manitowoc, Wis	12,055	79,442	91,497	1,032		1,032
Menominee, Wis	2,771	853	3,624			
Michigan City, Ind	147		147			
Milwaukee, Wis	504,186	445,261	949,447	4,865	11,384	16,249
Muskegon, Mich	39,558	27,080	66,638			
Oconto, Wis	300		300			
Pentwater, Mich	11		11			
Petoskey, Mich	1,034	519	1,663			
Portage Lake, Mich	90	236	326			
Port Washington, Wis	2,037		2,037			
Racine, Wis	11,469	11,077	22,546			
Saugatuck, Mich	220	55	275			
St. Joseph, Mich	9,463	16,553	26,016			
Sheboygan, Wis	14,076	10,456	24,532	4,325		4,325
South Haven, Mich	3,011	5,126	8,137	5,656		5,656
Sturgeon Bay, Wis	2,680	973	3,653			
Traverse City, Mich	8,173		8,173			
Two Rivers, Wis	662		662			
White Lake, Mich	90	10	100			
Total	1,241,509	1,085,623	2,327,132	96,369	112,744	209,113

LAKE SUPERIOR

The Lake Superior group of ports ranked third among the ports on the Great Lakes from point of package-freight tonnage. The principal port on this lake is Duluth-Superior, which handled about 93 per cent of total tonnage. The port of Keweenaw Waterway, Mich., was next in importance.

The principal commodities of the inbound package freight at Duluth-Superior were miscellaneous products with 214,467 tons, or 47 per cent; iron and steel manufactures, 87,535 tons, or 19 per cent; and cement 78,840 tons, or 17 per cent.

Of the outbound commerce of this port, flour was the leading commodity, there having been shipped 470,680 tons, or 77 per cent of the total. Iron and steel manufactures ranked next with 72,650 tons, or 12 per cent. Dairy products and copper were the more important among the other articles shipped, the former amounting to 53,764 tons and the latter to 25,644 tons.

The principal receipts at the Keweenaw Waterway were miscellaneous products, amounting to 10,067 tons, or 84 per cent. Copper, with 39,822 tons, comprised 99.3 per cent of the outbound commerce.

The package freight of Sault Ste. Marie was made up entirely of unclassified commodities, 6,551 tons having been received, while the shipments amounted to 4,272 tons.

The traffic of Lake Superior as a whole, including Canadian as well as United States traffic, is comprehensively shown by the statistics of traffic through the St. Marys Falls Canal (p. 56).

TABLE NO. 190.—*Package-freight movement on Lake Superior, calendar year 1928*

[Quantities in short tons]

Ports	Domestic package freight traffic			Foreign package freight traffic		
	Receipts	Shipments	Total	Imports	Exports	Total
Baudette, Minn	2,523	4,123	4,123	138	----------	138
Bayfield, Wis	1,050	----------	1,050	----------	----------	----------
Cornucopia, Wis	----------	100	100	----------	----------	----------
Duluth-Superior, Wis	455,103	613,616	1,068,719	----------	20,250	20,250
Grand Marias, Minn	474	294	768	----------	----------	----------
Grand Portage, Mich	12	168	180	----------	----------	----------
Harbor of Refuge, Mich	954	----------	954	----------	----------	----------
Keweenaw Waterway, Mich	11,986	40,101	52,087	----------	----------	----------
Marquette, Mich	----------	2,510	2,510	----------	----------	----------
Ontonagon, Mich	152	----------	152	----------	----------	----------
Presque Isle, Mich	----------	8,156	8,156	----------	----------	----------
Sault Ste. Marie, Mich	6,551	4,272	10,823	----------	----------	----------
Warroad, Minn	334	257	591	191	----------	191
Washburn, Wis	----------	175	175	5,892	----------	5,892
Total	479,139	671,249	1,150,388	6,221	20,250	26,471

LAKE HURON

The ports on Lake Huron ranked fourth among the ports on the Great Lakes in 1928 in the package-freight movement. Their total package freight amounted to 853,197 short tons. Alpena, Mich., the principal port in this group, handled 622,842 tons, or about 74 per cent of the total. Its position is due to its trade in cement, 621,672 tons of this commodity being shipped in 1928. Receipts at this port consisted entirely of fresh fish of local catch and destined for local consumption. Of the remaining ports of this area, Port Huron ranked next with 153,817 tons. Flour, with 60,854 tons, comprised 61 per cent of the inbound trade, while miscellaneous products accounted for the remainder of this traffic. The shipments at this port were made up of unclassified commodities to the extent of 40,480 tons, and salt with 15,198 tons.

The package freight shipments at Saginaw were entirely in cement, 56,315 tons having left the port. Fish, with 175 tons, made up the inbound movement. Other ports included in the tables were unimportant factors in the package freight.

TABLE No. 191.—*Package-freight movement on Lake Huron, calendar year 1928*

[Quanitites in short tons]

Ports	Domestic package freight			Foreign package freight		
	Receipts	Shipments	Total	Imports	Exports	Total
Alpena, Mich	1,170	621,672	622,842			
Cheboygan, Mich	890	1,025	1,915	3,267		3,267
Harbor Beach, Mich	85		85			
Mackinac, Mich	4,361	1,110	5,471			
Port Huron, Mich	98,033	55,784	153,817	606	640	1,246
Saginaw, Mich	175	56,315	56,490			
Total	104,714	735,906	840,620	3,873	640	4,513

LAKE ONTARIO AND ST. LAWRENCE RIVER

The Lake Ontario group of ports ranked fifth in volume of domestic package freight commerce of the Great Lakes. Oswego, the leading port of this district, was the only port which engaged in domestic package freight trade, this port having handled 173,359 tons from and to Lake Ontario. Sugar was the principal inbound commodity at Oswego, 54,928 tons, or about 73 per cent, having been received, while miscellaneous commodities made up the remainder of the domestic receipts. Of the domestic shipments amounting to 97,838 tons, 96 per cent were miscellaneous commodities. Sugar was the only commodity of importance entering into the foreign traffic of the port, 54,928 tons having been shipped to various Canadian ports. The above statistics on Oswego include the traffic of the New York State Barge Canal, the receipts of which in 1928 amounted to 74,481 tons and the shipments to 78,285 tons.

The foreign trade of the other ports contained in the table, with the exception of Lewiston, which exported 754 tons of automobiles, was made up of unclassified commodities carried in small motor craft to and from near-by Canadian ports.

TABLE No. 192.—*Package freight movement on Lake Ontario, calendar year 1928*

[Quantities in short tons]

Ports	Domestic package freight			Foreign package freight		
	Receipts	Shipments	Total	Imports	Exports	Total
Alexandria Bay, N. Y				82	42	124
Cape Vincent, N. Y				352	32	382
Charlotte, N. Y				10	29	39
Clayton, N. Y				177	46	223
Lewiston, N. Y				41	789	830
Oswego, N. Y	75,521	97,838	173,359	10	54,928	54,938
Total	75,521	97,838	173,359	672	55,866	56,538

MOVEMENT OF PRINCIPAL COMMODITIES

Lack of information makes impossible an analysis of the channels through which miscellaneous commodities flow. Apparently there is no definite route for the greater portion of this traffic. While there is a well-defined movement of package freight on through routes from the head of the Lakes, particularly Duluth-Superior, the trend of this movement at lower lake ports, where the major part of the traffic consists of local movements in all directions, is more difficult to follow.

An analysis of the movement of a few of the more important commodities in this trade follows. It will be noted that shipments and receipts of these articles do not balance. This is due, in part, to the inclusion of the particular article in the unclassified totals for some of the minor ports. In addition, certain tonnage originates at or is destined to unimproved harbors from which no statistics are reported.

Flour was the chief package freight commodity moving on the Great Lakes in 1928. The traffic amounted to 846,418 tons. The principal shipping points were Duluth-Superior, about 53 per cent of the total, Milwaukee about 29 per cent, and Chicago 17 per cent. Buffalo received about 76 per cent of the total, while Port Huron, Mich., and Erie, Pa., received 10 and 9 per cent, respectively.

The following tabulation illustrates the flow of the flour trade during 1928:

TABLE NO. 193.—*Lake shipments and receipts of flour, calendar year 1928*

[Quantities in short tons]

Shipments		Receipts	
Port	Amount	Port	Amount
Duluth-Superior, Minn. and Wis	450,705	Buffalo, N. Y	484,360
Milwaukee, Wis	243,097	Port Huron, Mich	60,854
Chicago, Ill	149,700	Erie, Pa	58,456
Oswego, N. Y	1,592	Fairport, Ohio	20,500
Buffalo, N. Y	1,324	Ludington, Mich	10,064
Total	846,418	Total	634,234

CEMENT

The movement of cement has made rapid strides during the past five years, aggregating 754,326 tons in 1928 as compared with 219,197 tons in 1923. A large, modern plant has been established at Manitowoc and large additional storage silos have been recently built at Milwaukee, Chicago, and elsewhere. The greater part of this tonnage originated at Alpena, Mich., which accounted for 82 per cent of the total. Detroit and Milwaukee were the principal receiving ports with 340,062 tons and 194,510 tons, respectively.

The table below gives a complete picture of the flow of the cement trade during 1928.

TABLE NO. 194.—*Lake shipments and receipts of cement, calendar year 1928*

[Quantities in short tons]

Shipments		Receipts	
Port	Amount	Port	Amount
Manitowoc, Wis	73,890	Detroit, Mich	340,062
Saginaw, Mich	56,315	Milwaukee, Wis	194,510
Buffalo, N. Y	1,860	Duluth-Superior, Minn. and Wis	78,840
Cleveland, Ohio	463	Cleveland, Ohio	56,358
Sturgeon Bay, Wis	76	Chicago, Ill	56,360
Detroit, Mich	50	Grand Haven, Mich	2,223
Alpena, Mich	621,672	Menominee, Mich	1,710
		Port Washington, Wis	1,463
		Green Bay, Wis	1,416
		Kewaunee, Wis	375
		Algoma, Wis	342
		Sturgeon Bay, Wis	116
		Grand Marais, Minn	112
Total	754,326	Total	713,887

Transportation of automobiles, trucks, and tractors has risen to a place of importance in the lake trade of recent years. As almost 80 per cent of the country's production of automobiles is in States that border the Great Lakes, it is only natural to suppose that when possible the various manufacturers of motor vehicles will take advantage of the water route for shipping their products. The favorable results obtained by those companies which have pioneered this movement and convinced themselves by experience of the economy which this method of distribution offers, both in time and money, warrants a wider utilization of the water route in the future.

As an example of its faith in the future of this mode of shipping automobiles, one steamship company on the Great Lakes has equipped 12 vessels which are used almost exclusively in transporting automobiles to and from the various lake ports. One of these boats, which before its conversion to the automobile trade was an ore carrier, makes a round trip daily except Mondays, between Detroit and Cleveland, carrying a cargo of 400 cars each trip.

Including a relatively small portion of privately owned automobiles, the movement aggregated 325,822 tons in 1928. The traffic was confined largely to exchanges between ports on Lake Erie and with Lake Michigan ports.

Following is a résumé of the automobile trade during 1928:

TABLE NO. 195.—*Shipments and receipts of automobiles and trucks, by lake districts, calender year 1928*

[Quantities in short tons]

Ports	Shipments	Receipts
LAKE ERIE PORTS		
Detroit, Mich	234,860	18,945
Buffalo, N. Y	23,031	58,524
Toledo, Ohio	17,162	1,540
Cleveland, Ohio	14,336	96,672
Oswego, N. Y	----------	800
Total	289,389	176,481
LAKE MICHIGAN PORTS		
Kenosha, Wis	14,867	5,243
Milwaukee, Wis	11,326	29,511
Grand Haven, Mich	4,408	1,020
Ludington, Mich	2,681	2,716
Muskegon, Mich	1,578	2,062
Racine, Wis	1,350	----------
Manistee, Mich	117	65
Green Bay, Wis	----------	21,922
Traverse City, Mich	----------	8,108
Total	36,327	70,647
LAKE SUPERIOR PORTS		
Duluth-Superior, Minn. and Wis	----------	25,365
Keweenaw Waterway Ports, Mich	----------	717
Total	----------	26,082
LAKE HURON PORTS		
Port Huron, Mich	106	----------
Grand total	325,822	273,210

Automobiles and trucks recorded at an average weight of 3,000 pounds.

The trade in copper, although it amounted to but 71,409 short tons in 1928, represents a value of over $20,000,000. Most of the copper movement originated at Keweenaw Waterway, Mich., and Duluth-Superior and was destined for Detroit and Buffalo.

TABLE NO. 196.—*Lake shipments and receipts of copper, calendar year 1928*

[Quantities in short tons]

Shipments		Receipts	
Port	Amount	Port	Amount
Keweenaw Waterway, Mich	39,822	Detroit, Mich	28,857
Duluth-Superior, Minn. and Wis	25,644	Buffalo, N. Y	8,633
Buffalo, N. Y	1,969	Port Huron, Mich	1,867
Detroit, Mich	1,900	River Rouge, Mich	1,797
Muskegon, Mich	1,701	Muskegon, Mich	216
Cleveland, Ohio	373		
Total	71,409	Total	41,370

PACKAGE FREIGHT TERMINALS

The principal ports on the Lakes provide terminals more than adequate for the traffic in package freight. Many water-front properties which could be utilized for this purpose are idle, or very little used.

The majority of the railroads serving the larger ports on the Lakes own and operate water terminals. Generally speaking, these terminals are open to all water carriers having interchange business with the owning railroad. As a rule, no charge is made against the vessel for dockage when the owning carrier has received or will receive a road haul on traffic passing over its terminal.

In the case of traffic originating at, or destined to, local points within the port area and on which the rail line receives no haul a charge is made against the vessel for the use of the facility. In most cases, however, the regular water lines contract for the use of the terminals and pay the owning carrier on the basis of the amount of local traffic handled over the property. Such charges are applied by the boat line against the shipper or consignee. In a number of instances the railroads maintain their water-front properties solely for the purpose of interchange of freight moving over their lines, the privilege of conducting local business being denied to the water carriers.

At Chicago and Buffalo it is the practice of some of the water carriers engaged in interlake traffic to call at their own terminals to discharge smaller consignments and then to shift the vessel to railroad or private terminals to deliver or receive larger consignments. In this manner, the boat lines gain the advantage of direct delivery to connections and obtain for themselves the revenue which would otherwise be expended in absorbing switching or drayage charges.

Delays in the ports are occasioned by this method, but the cost of operating the ship is offset by the added revenue received and the water carriers have found it practicable and economical.

Water line and municipal terminals having facilities for direct interchange between rail and water are few.

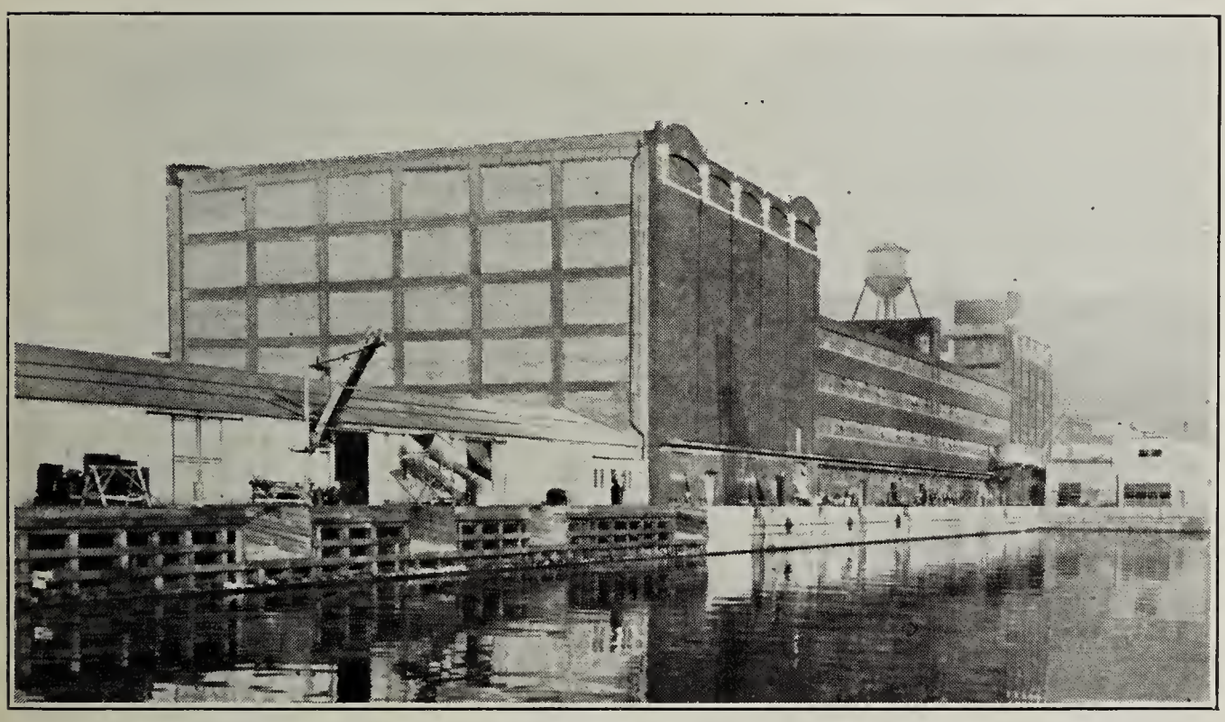
The terminals of the water lines, whether owned or leased, are generally operated for the exclusive use of the owning or leasing line. In some instances other lines are permitted to dock at the property when in noncompetitive business.

The municipal terminals at Erie and South Haven, Mich., and the municipal pier at Chicago are the only publicly owned facilities available to all vessels. The latter, however, leases portions of its frontage and warehouses to the exclusive use of certain lines. Another municipal property at Chicago is leased exclusively to a water line.

The municipal pier at Cleveland is under exclusive lease to two water carriers and that of the city of Toledo is also under lease.

Duluth, Detroit, and Buffalo have no municipal water-front facilities available to vessels in the package freight trade.

THE NAVY PIER, CHICAGO, ILL.



McDOUGALL PACKAGE FREIGHT TERMINAL AND WAREHOUSES, DULUTH, MINN.

PETOSKEY PORTLAND CEMENT CO.'S SILO FOR STORAGE OF BULK CEMENT, MILWAUKEE, WIS.

HURON PORTLAND CEMENT CO.'S SILO FOR STORAGE OF BULK CEMENT, MILWAUKEE, WIS.

CHICAGO & NORTH WESTERN RAILWAY TERMINAL, MILWAUKEE WIS. (NICHOLSON UNIVERSAL STEAMSHIP CO., LESSEE)

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Superior*

Port	Duluth, Minn.		
Name or number	Northern Pacific Ry. warehouses No. 1 and No. 2.	Northern Pacific Ry. warehouses No. 3 and No. 4.	Northern Pacific Ry. warehouses No. 5 and No. 6.
Owner	Northern Pacific Ry	Northern Pacific Ry	Northern Pacific Ry.
Operator	do	do	Do.
Exact location	Railroad dock, warehouses No. 1 and No. 2, Bay Slip.	Dock warehouses No. 3 and No. 4, Slips 1 and 2, between Sixth Avenue west and Eighth Avenue west.	Dock warehouses No. 5 and No. 6, Lake Avenue Slip.
Berthing capacity, feet	2,308	No. 3, 478; No. 4, 998	No. 5, 983; No. 6, 1,134.
Depth alongside, feet	22	21	22.
Transit shed capacity, square feet.	70,894	No. 3, 11,500; No. 4, 15,864	No. 5, 13,064; No. 6, 13,608.
Warehouse capacity (additional to transit shed capacity), square feet.	135,600	No. 3, 28,566; No. 4, 40,890	No. 588,863; No. 6, 101,493.
Mechanical facilities	None	None	None.
Principal commodities handled.	General merchandise	General merchandise	General merchandise.
Conditions of use	Available to any boats handling merchandise on which the Northern Pacific secures road haul or switch move.	Available to any boats handling merchandise on which the Northern Pacific secures road haul or switch move, also to boats unloading freight for local delivery and the handling of passengers. Dock No. 4 is under partial lease to the Great Lakes Transit Corporation and the Northern Navigation Co. for handling of freight and passenger traffic during the season of navigation.	Available to any boats handling merchandise on which the Northern Pacific secures road haul or switch move.
Carriers permitted to use terminal.	Any		
Carriers excluded	None	None	None.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Superior*—Continued

Port	Duluth, Minn.—Continued		
Name or number	Chicago, St. Paul, Minneapolis & Omaha Ry	Great Northern Ry	Minneapolis, St. Paul, Sault Ste. Marie Ry.
Owner	do	do	Do.
Operator	do	do	Do.
Exact location	Foot of Seventh Avenue West and Railroad Street.	Foot of Corning Avenue, Superior, Wis.	Connor's Point, Superior, Wis.
Berthing capacity, feet	900	1,695	1,142.
Depth alongside, feet	20	22	21.
Transit shed capacity, square feet.		33,855	9,887.
Warehouse capacity (additional to transit shed capacity), square feet.	72,000 floor space (900 by 80)	381,920	79,321.
Mechanical facilities	None	None	None.
Principal commodities handled.	General merchandise	Flour and general merchandise	General merchandise.
Conditions of use	Handle through freight only; no local Duluth freight handled.	Available to any boat handling commodities on which the Great Northern Ry. enjoys a road haul or switch move.	Available to all boats handling merchandise on which the Soo Line enjoys a line haul or switch move.
Carriers permitted to use terminal.	All boats	All	All.
Carriers excluded	None	None	None.

Ports	Duluth, Minn.—Continued	Keweenaw Waterway, Mich.	Sault Ste. Marie, Mich.
Name or number	McDougall Terminal Warehouse Co	Copper Range R. R. Co	The Kemp Dock.
Owner	do	do	J. B. Kemp.
Operator	do	do	Do.
Exact location	Ninth Avenue West and Railroad Street	Houghton, Mich., west of Houghton-Hancock Bridge.	Foot of Glen Avenue.
Berthing capacity, feet	2,050	1,200	Slip, 406; face of dock, 276.
Depth alongside, feet	22	20 to 22	Slip, 13 to 20 feet; face of dock, 20 feet.
Transit shed capacity, square feet.	72,800	73,500	17,680.
Warehouse capacity (additional to transit shed capacity), square feet.	302,000	None	4,080.
Mechanical facilities	Two electric traveling cranes	None; use hand trucks	One small derrick.
Principal commodities handled.	General merchandise	General merchandise, steel, mining machinery, Nitrate of soda, sugar, and automobiles.	General merchandise.
Conditions of use	Open to all rail lines and boats	Local dockage charge for all freight which varies according to commodities from 40 to 65 cents per ton.	Public.
Carriers permitted to use terminal.	All	All	All.
Carriers excluded	None	None	None.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Michigan*

Ports	Marinette, Wis.	Kewaunee, Wis.	Manitowoc, Wis.
Name or number	Marinette Fuel & Dock Co	Kewaunee Dock Co	Goodrich Transit Co. Dock.
Owner	do	A. W. Teske	Goodrich Transit Co.
Operator	do	do	Do.
Exact location		Kewaunee	Foot of Fifth and Commercial Streets.
Berthing capacity, feet		248	750.
Depth of water alongside, feet.		19	18.
Transit shed capacity, square feet.	24,000	8,000	20,850.
Warehouse capacity, square feet.	None	None	13,050 and 2,400.
Mechanical facilities	None	None	3-ton chain fall crane, hand pull.
Principal commodities handled.	Furniture, leather, and groceries	General merchandise	Aluminum ware, steel and iron, and general merchandise.
Conditions of use	Public	Private	Private.
Carriers permitted to use terminal.	All	West Ports Steamship Line	Goodrich Transit Co.
Carriers excluded	None	All others	All others.

Ports	Manitowoc, Wis.—Continued	Sheboygan, Wis.	
Name or number	Hall Dock	Goodrich Transit Co. Dock	Municipal Dock.
Owner	McMullin & Pitz	Goodrich Transit Co	City of Sheboygan.
Operator	West Ports Steamship Line	do	West Ports Steamship Line.
Exact location	Just above Goodrich Docks	Foot of Pennsylvania Avenue	Eighth Street Bridge.
Berthing capacity, feet	200	500	150.
Depth of water alongside, feet.	19	19	19.
Transit shed capacity, square feet.	3,000	15,000	15,000.
Warehouse capacity, square feet.	None	None	None.
Mechanical facilities	None	None	None.
Principal commodities handled.	General merchandise	Furniture, enamelware, and general merchandise.	Furniture, leather, general merchandise.
Conditions of use	Private	Private	Private.
Carriers permitted to use terminal.	West Ports Steamship Line	Goodrich Transit Co	West Ports Steamship Line.
Carriers excluded	All others	All others	All others.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Port	Milwaukee, Wis.		
Name or number	Manitowoc Portland Cement Co	Petoskey Portland Cement Co	Te minal Warehouse No. 3.
Owner	do	do	Various.
Operator	do	do	Terminal Warehouse Co.
Exact location	Left bank Burnham Canal	Right bank Burnham Canal	West Water and Buffalo Streets.
Berthing capacity, feet			540.
Depth of water alongside, feet.	19	19	20.
Transit shed capacity, square feet.	2 silo bins	5 silo bins	None.
Warehouse capacity, square feet.	21,000 barrels	55,000 barrels	40,000.
Mechanical facilities	Two 6-inch blow pipe lines, belt conveyors and gravity spout, 4 Bates packing machines.	6-inch blow pipe lines, belt conveyors and gravity spout, 3 Bates packing machines.	None.
Principal commodities handled.			General merchandise and sugar.
Conditions of use	Private	Private	Public.
Carriers permitted to use terminal.	Manitowoc Portland Cement Co	Petoskey Portland Cement Co	All.
Carriers excluded	All others	All others	None.

Port	Milwaukee, Wis.—Continued		
Name or number	Chicago, Milwaukee, St. Paul & Pacific R. R., Nos. 4 and 5.	Chicago, Milwaukee, St. Paul & Pacific R. R., Nos. 8 and 9.	Huron Portland Cement Co.
Owner	Chicago, Milwaukee, St. Paul & Pacific R. R.	Chicago, Milwaukee, St. Paul & Pacific R. R.	Do.
Operator	Canada Atlantic Transit Co	do	Do.
Exact location	West Water Street at bridge	Foot of South Water Street, extended	Left bank Burnham Canal.
Berthing capacity, feet	800	600	
Depth of water alongside, feet.	20	20	19.
Transit shed capacity, square feet.	46,735	34,000	18 silo bins.
Warehouse capacity, square feet.	None	None	100,000 barrels.
Mechanical facilities	None	None	Screw carrier and bucket elevators, belt conveyors and gravity spout, 6 Bates packing machines.
Principal commodities handled.	Grain products, flour, wool waste, and general merchandise, sugar, twine, rubber, cocoa beans.	Flour and grain products	
Conditions of use	On local traffic, lease basis; on interchange traffic, no charge.	Public, interchange dock	Private.
Carriers permitted to use terminal.	Canada Atlantic Transit Co	All	Huron Portland Cement Co.
Carriers excluded	All others	None	All others.

Port	Milwaukee, Wis.—Continued		
Name or number	Hansen Storage, house No. 7	Goodrich Transit Co. Dock	Chicago, Milwaukee, St. Paul & Pacific R. R No. 10.
Owner	Hansen Storage Co	I. J. Rosenberg	Chicago, Milwaukee, St. Paul & Pacific R. R.
Operator	do	Goodrich Transit Co	Great Lakes Transit Co.
Exact location	On Erie Street, between Jefferson and Jackson Streets.	Michigan Street Bridge	Foot of Fifth Street.
Berthing capacity, feet	700	420	600.
Depth of water alongside, feet.	22	20	20.
Transit shed capacity, square feet.	None	25,365	35,800.
Warehouse capacity, square feet.	15,000	None	None.
Mechanical facilities	None	Two hand cranes, used only in shed	None.
Principal commodities handled.	Autos and sugar	General merchandise	Sugar and general merchandise.
Conditions of use	Public	Private	On local traffic, lease basis; on interchange traffic, no charge.
Carriers permitted to use terminal.	All	Goodrich Transit Co	Great Lakes Transit Co.
Carriers excluded	None	All others	All others.

Port	Milwaukee, Wis.—Continued		
Name or number	Chicago & North Western Dock	Pere Marquette Line Steamers Dock	Abbot Dock.
Owners	Chicago & North Western Ry	Pere Marquette Ry	Hansen Storage Co.
Operator	do	Pere Marquette Line Steamers	Nicholson Universal Steamship Co.
Exact location	South Water Street and Chicago & North Western bridge.	Fowler and West Water Streets	On Erie at Jackson.
Berthing, capacity, feet	600	186	240.
Depth of water alongside, feet.	22	20	22.
Transit shed capacity, square feet.	81,600	20,540	29,600.
Warehouse capacity, square feet.	None	None	None.
Mechanical facilities	None	One electric chain conveyor on ramp	None.
Principal commodities handled.	Flour and grain products eastbound, general merchandise westbound.	Sugar, grain products, grain (BB); general merchandise.	Autos, general merchandise.
Conditions of use	Open to all lines when Chicago and North Western receives haul; it is an interchange dock.	Private	Private.
Carriers permitted to use terminal.	All	Pere Marquette Line Steamers	Nicholson Universal Steamship Co.
Carriers excluded	None	All others	All others.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Port	Milwaukee, Wis.—Continued		
Name or number	Terminal Warehouse No. 12	Chicago, Milwaukee, St. Paul & Pacific R. R. No. 14.	Chicago, Milwaukee, St. Paul & Pacific R. R. No. 15.
Owner	Various	Chicago, Milwaukee, St. Paul & Pacific R. R.	Chicago, Milwaukee, St. Paul & Pacific R. R.
Operator	Terminal Warehouse Co	do	Do.
Exact location	South Water and Clinton	Foot of Grove Street, extended	Foot of Seventh Street.
Berthing capacity, feet	400	255	200.
Depth of water alongside, feet.	22	18	18.
Transit shed capacity, square feet.	None	18, 960	10, 480.
Warehouse capacity, square feet.	160, 000	None	None.
Mechanical facilities	None	None	None.
Principal commodities handled.	Sugar and general merchandise	Mill products	Mill products.
Conditions of use	Public	Public, interchange dock	Public, interchange dock.
Carriers permitted to use terminal.	All	All	All.
Carriers excluded	None	None	None.

Port	Milwaukee, Wis.—Continued			
Name or number	Municipal open dock	Chicago & Northwestern open dock	Universal Dock	Marine terminal.
Owner	City of Milwaukee	Chicago & Northwestern Ry	Chicago & Northwestern Ry	Marine Realty Co.
Operator	do	do	Nicholson-Universal Steamship Co.	Wisconsin & Michigan Transportation Co. and West Ports Steamship Line.
Exact location	Inner side of Jones Island	Foot of Washington Street	Foot of Washington Street	Broadway Bridge.
Berthing capacity, feet	800	640	670	400.
Depth of water alongside, feet	22	22	22	20.
Transit shed capacity, square feet	None	None	55,000 and 26,000	34,500.
Warehouse capacity, square feet	None	None	26,000	None.
Mechanical facilities	Locomotive crane with magnet	None	None	None.
Principal commodities handled	Sugar, iron, and steel	Sugar, woodpulp, china clay, iron, and steel.	Autos and general use	General merchandise.
Conditions of use	Public	Public, interchange dock	Private	Private.
Carriers permitted to use terminal	All	All	Nicholson-Universal Steamship Co.	Wisconsin & Michigan Transportation Co. and West Ports Steamship Line.
Carriers excluded	None	None	All others	All others.

Port	Racine, Wis.	Kenosha, Wis.	
Name or number	Goodrich Transit Co	Municipal Dock	West Ports Dock.
Owner	do	City of Kenosha	West Ports Steamship Line.
Operator	do	Nicholson-Universal Steamship Co	Do.
Exact location	401 Dodge Street	Foot of Fourth Avenue	Foot of Fifty-first Place.
Berthing capacity, feet	270	1,000	200.
Depth of water alongside, feet	16	19	18.
Transit shed capacity, square feet.	12,000	13,600 and 19,800	17,000.
Warehouse capacity, square feet.	None	None	None.
Mechanical facilities	None	None	None.
Principal commodities handled.	General merchandise	Automobiles	Autos, parts, and general merchandise.
Conditions of use	Private	Private	Private
Carriers permitted to use terminal.	Goodrich Transit Co	Nicholson-Universal Steamship Co	West Ports Steamship Line.
Carriers excluded	All others	All others	All others.

Port	Waukegan, Ill.	Chicago, Ill.		
Name or number	Municipal dock	Goodrich Dock	Municipal Pier	Municipal Pier.
Owner	City	Chicago Dock & Canal Co	City of Chicago	City of Chicago.
Operator	Crosby Steamship Co. (Hill Line)	Goodrich Transit Co	Chicago, Duluth & Georgian Bay Transit Co.	Do.
Exact location	Foot of Clayton Street	Chicago, east end Austin Avenue, north side of Ogden Slip.	Chicago Harbor, foot of Grand Avenue.	Mouth of Chicago River.
Berthing capacity, feet	250	Face of dock 392, available 216	300	7,000.
Depth of water alongside, feet	19	Varies from very shoal to 14; west end unable to dock steamers.	24	16 west end, 30 east end.
Transit shed capacity, square feet	12,500	13,085	10,000	468,000, freight sheds, lower floor; 317,000, passenger sheds, upper floor.
Warehouse capacity, square feet		None	None	40,000 under lease used as storage warehouse.
Mechanical facilities	None	Hand trucks	None	None.
Principal commodities handled	Tanned goods, wire, general merchandise and hardware.	Miscellaneous package freight	General merchandise	Mostly market produce from Michigan peninsula; package freight and newsprint paper.
Conditions of use	Leased until 1937	Private	Private	Public.
Carriers permitted to use terminal.	Crosby Steamship Co. (Hill Line)	Goodrich Transit Co. and Benton Transit Co.	Chicago, Duluth & Georgian Bay Transit Co.	Any carrier.
Carriers excluded	All others	All others	All others	None.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Port	Chicago, Ill.—Continued			
Name or number	Eighteenth Street Transfer Dock	Chicago, Rock Island & Pacific Ry.	Chicago Great Western R. R.	Chicago River & Indiana R. R. Co.
Owner	Erie R. R.	do	Baltimore & Ohio: Chicago Terminal Co, Chicago Great Western R. R.	Do.
Operator	do	do	Chicago Great Western R. R.	Do.
Exact location	Chicago River, South Branch, east bank, south of Eighteenth Street.	Chicago River, South Branch, east bank between Taylor and Sixteenth Streets.	Chicago River between Harrison and Polk Streets.	Chicago River, west fork of South Branch, south bank at Twenty-seventh and Robey Streets.
Berthing capacity, feet	199	3,580	700	4,000.
Depth of water alongside, feet	18	26	26	25.
Transit shed capacity, square feet	No shed or warehouse; platform capacity 2,388 square feet.	12,259	None	100,000.
Warehouse capacity, square feet	None	None	200,000	None
Mechanical facilities	None	None	Four electric elevators in warehouse, spiral inclined chutes.	Hand trucks, warehouse trucks.
Principal commodities handled	Merchandise, oil meal, soap, clay, hardware, paint, paper, white lead, varnish, and whiting.	General merchandise	Canned goods and flour	Grain products, eastbound; sugar and canned goods, westbound.
Conditions of use	Private	Restricted	For interchange only	For interchange only.
What carriers are permitted to use terminal.	Lighters of the Merchants Lighterage Co.	Rutland-Lake Michigan Transit Co., Great Lakes Transit Co., Canada Atlantic Transit Co., Merchants Lighterage Co.	Vessels interchanging cargo with Chicago Great Western R. R.	Vessels interchanging cargo with Chicago River & Indiana R. R.
What carriers are excluded	All others	All others	All others	All others.

Port	Chicago, Ill.—Continued			
Name or number	Sixteenth Street Dock House	Canada Atlantic Transit Co. of United States.	Great Lakes Transit Corporation	Chicago & South Haven Steamship Co.
Owner	Chicago & Western Indiana R. R.	Chicago Dock & Canal Co	Chicago Dock & Canal Co	Do.
Operator	Grand Trunk Ry., Chicago & Eastern Illinois Ry., Wabash R. R. and Atchison, Topeka & Santa Fe Ry. (tenant).	Canada Atlantic Transit Co. of United States.	do	Do.
Exact location	Chicago River, South Branch, east bank, between Sixteenth and Eighteenth Streets.	307 East North Water Street, Chicago River, north side, east of Michigan Avenue Bridge.	Chicago River, north side, east of the foot of St. Clair Street.	Chicago River, north side, foot of Orleans Street.
Berthing capacity, feet	800	750	340	170.
Depth of water alongside, feet	18	20	19	16 to 18.
Transit shed capacity, square feet	8,260	45,000	44,000	2,300.
Warehouse capacity, square feet	6,369	30,000	None	8,500.
Mechanical facilities	None other than 2-wheel warehouse trucks.	None	None	Mechanical unloading device for unloading small package freight.
Principal commodities handled	Westbound L. C. L. general merchandise in considerable quantity; some miscellaneous carload freight.	General merchandise; all classes	Eastbound, flour and other grain (feed, etc.), occasionally bulk grain. Westbound, general merchandise, sugar, coffee, canned goods, and dry goods.	Fruit and vegetables, pianos, castings, and miscellaneous package freight.
Conditions of use	For interchange only	Private	Private	Private.
What carriers are permitted to use terminal.	All lake carriers having interchange with any of the three operators listed above are permitted to use the main dock. The Merchants Lighterage Co. handle business for the 4 companies listed, using the transit platform.	Canada Atlantic Transit Co. of United States.	Great Lakes Transit Corporation	Chicago & South Haven Steamship Co.
What carriers are excluded	All others	All others	All others	All others.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Port	Chicago, Ill.—Continued		
Name or number	North Pier Terminal Co., warehouses 1 to 17, inclusive.	North Pier Terminal Co., warehouses 18 and 19	North Pier Terminal Co., warehouses 20 to 22, inclusive.
Owner	Chicago Dock & Canal Co	Land, Chicago Dock & Canal Co., buildings, Wakem and McLaughlin.	Land, Chicago Dock & Canal Co., buildings, Wakem & McLaughlin.
Operator	North Pier Terminal Co	North Pier Terminal Co	North Pier Terminal Co.
Exact location	North side of Ogden Slip, at mouth of the Chicago River.	Chicago River, north side, east of Michigan Avenue Bridge.	South side of Ogden Slip, near mouth of Chicago River.
Berthing capacity, feet	1,620	120	200.
Depth of water alongside, feet.	21	22	21.
Transit shed capacity, square feet.	194,400	15,000	57,600.
Warehouse capacity, square feet.	1,150,600	85,000	92,400.
Mechanical facilities	Thirty elevators and 2 piling machines	Two elevators	Three elevators.
Principal commodities handled.	Space rented, and general warehouse	Fruits and vegetables	General merchandise and paper (newsprint).
Conditions of use	Public	Public	Public.
What carriers are permitted to use terminal.	All water and railroad carriers	All water and railroad carriers	All water and railroad carriers.
What carriers are excluded	None	None	None.

Port	Chicago, Ill.—Continued			
Name or number	Goodrich Dock	Goodrich Dock	Goodrich Dock	Goodrich Dock.
Owner	Chicago Dock & Canal Co	Chicago Dock & Canal Co., and Grand Trunk Ry.	Michigan Central R. R	Illinois Central Railroad.
Operator	Goodrich Transit Co	Goodrich Transit Co	Goodrich Transit Co.	Goodrich Transit Co.
Exact location	Chicago, east end Austin Avenue, south side Ogden Slip.	Chicago River, north side, west of United States lighthouse reservation (409 East North Water Street).	Chicago River, south side, south end of Michigan Avenue Bridge.	Chicago River, south side, east of Michigan Avenue Bridge.
Berthing capacity, feet	440	340	241	240.
Depth of water alongside, feet	20	20	20	20.
Transit shed capacity, square feet	42,286	32,509	13,329, includes adjoining Illinois Central Dock property leased to Goodrich Transit Co.	Included in adjoining Michigan Central R. R. Dock property leased to Goodrich Transit Co., dock No. 3.
Warehouse capacity, square feet	None	None	None	None.
Mechanical facilities	Hand trucks	Hand trucks	Hand trucks	Hand trucks.
Principal commodities handled	Miscellaneous package freight	Miscellaneous package freight	Miscellaneous package freight	Miscellaneous package freight.
Conditions of use	Private	Private	Private	Private.
What carriers are permitted to use terminal.	Goodrich Transit Co	Goodrich Transit Co	Goodrich Transit Co	Goodrich Transit Co.
What carriers are excluded	All others	All others	All others	All others.

Port	Chicago, Ill.—Continued		
Name or number	North Pier Terminal Warehouse 1–22	East Chicago Dock Terminal Co	Navy pier.
Owner	National Terminal Corp	National Terminal Corp	City of Chicago.
Operator	North Pier Terminal Warehouse	do	Do.
Exact location	All warehouses with exception of 18 and 19 located on Ogden Slip; warehouses 18 and 19 are located at 365–402 East North Water Street, with dock frontage on the Chicago River, north side of river.	On the Indiana Harbor Ship Canal at the fork adjacent to Canal Street, East Chicago, Ind.	Mouth of Chicago River.
Berthing capacity, feet	2,500, warehouses 1–22, inclusive	Approximately 3,390 when all completed; 680 now being in actual operation.	4,700 adjoining transit sheds; 3,600 open wharfage.
Depth of water alongside, feet.	18 to 22	22	21.
Transit shed capacity, square feet.	None	First unit to be constructed this fall, 800 by 100	468,000 lower level.
Warehouse capacity, square feet.	2,000,000 approximately		318,000 second level.
Mechanical facilities	Electric conveyors and hoists	2 30-ton, 70-foot boom, electric gantry cranes; 2 30-ton, 55-foot boom, steam locomotive cranes; 1 10-ton, 40-foot boom gasoline tractor crane. Magnets up to 65 inches. Clamshell buckets up to 2½ yards; steel buckets for handling all types of bulk cargoes. Coaling facilities for vessels.	None.
Principal commodities handled.	Sugar, wood pulp, newsprint, canned goods, and miscellaneous package freight.	Iron and steel products, crude oil, sand, gravel, coal, scrap iron, and all other raw and finished products that can be stored in the open. Crude oil is pumped direct from vessels into tank cars.	Manufactured products, autos, some fruits and vegetables, newsprint paper rolls, and passengers.
Conditions of use	Public	Public	Leased in sections to steamship and storage companies.
Carriers permitted to use terminal.	All carriers	All carriers	Any carrier, by arrangement, generally those of tenants.
Carriers excluded	None	None	None.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Port	Chicago, Ill.—Continued		
Name or number	Webster Avenue Dock	Erie Street Transfer Dock	Eighteenth Street Transfer Dock.
Owner	Erie R. R.	Part owned by Rutland Transit Co. and leased by Erie; balance owned by Erie R. R.	Erie R. R.
Operator	do	Erie R. R.	Do.
Exact location	Webster Avenue, North Branch Chicago River	Erie Street, North Branch Chicago River	Chicago River, South Branch, east bank south of Eighteenth Street.
Berthing capacity, feet	500	500	199.
Depth of water alongside, feet.	18	18	18.
Transit shed capacity, square feet.	None	None	No shed or warehouse; platform capacity, 2,388.
Warehouse capacity, square feet.	8,500	32,995	None.
Mechanical facilities	None	Hand-operated crane	None.
Principal commodities handled.	Merchandise and carload freight	Merchandise and carload freight	Merchandise, oil meal, soap, clay, hardware, paint, paper, white lead, varnish, etc.
Conditions of use	Private	Private	Private.
Carriers permitted to use terminal.	Erie R. R. only	Erie R. R. only	Lighters of the Merchants Lighterage Co.
Carriers excluded	All others	All others	All others.

Port	Chicago, Ill.—Continued		
Name or number	Navy Pier	Navy Pier	Sixteenth Street Dock House.
Owner	City of Chicago	City of Chicago	Chicago & Western Indiana R. R.
Operator	Nicholson Universal Steamship Co	Nicholson Universal Steamship Co	Grand Trunk Ry., Chicago & Eastern Illinois Ry., Wabash Ry., and Atchison, Topeka & Santa Fe Ry. (tenant).
Exact location	Mouth of Chicago River, north side	Mouth of Chicago River, north side	Chicago River, South Branch, east bank, between Sixteenth and Eighteenth Streets.
Berthing capacity, feet	1200 [1]	1,200	800.
Depth of water alongside, feet.	20 [1]	20	18.
Transit shed capacity, square feet.	24,000 [1]	24,000	8,260.
Warehouse capacity, square feet.	96,000 [1]	96,000	6,369.
Mechanical facilities	None [1]	None	None other than 2-wheel warehouse trucks.
Principal commodities handled.	Automobiles [1]	Automobiles	Westbound L. C. L. general merchandise in considerable quantities; some miscellaneous carload freight.
Conditions of use	New [1]	New	For interchange only.

Carriers permitted to use terminal.	All carrying autos [1]	All carrying autos	All lake carriers having interchange with any of the 3 operators listed above are permitted to use main dock; the Merchants Lighterage Co. handle business for the four companies listed, using transit platform.
Carriers excluded	All not carrying autos [1]	All not carrying autos	All others.

[1] Pertains only to space used by Nicholson Universal Steamship Co.

Port	Chicago, Ill.—Continued		
Name or number	Chicago Great Western Railroad	Navy Pier	Navy Pier.
Owner	do	City of Chicago	City of Chicago.
Operator	do	Chicago, Duluth & Georgian Bay Transit Co	Detroit & Cleveland Navigation Co.
Exact location	Chicago River between Harrison and Polk Streets.	Mouth of Chicago River, north side	Mouth of Chicago River, north side.
Berthing capacity, feet	700	100 (running feet) [1]	200.[2]
Depth of water alongside, feet.	Regular Chicago River depth	20 approximately [1]	17.[2]
Transit shed capacity, square feet.	None	10,000 [1]	20,000.[2]
Warehouse capacity, square feet.	200,000 but used for only railroad business	10,000 [1]	
Mechanical facilities	None	None [1]	None.[2]
Principal commodities handled.	Grain products, hides, tan bark and L. C. L. business, westbound only.	Passengers and their baggage only [1]	Automobiles, produce, general merchandise.[2]
Conditions of use	For business consigned to or originating at points on C. G. W. R. R. or connecting lines beyond Chicago switching district only.	Leased from city of Chicago [1]	June, July, August, September.[2]
Carriers permitted to use terminal.	C. G. W. R. R. and boats delivering business to that railroad.	Ourselves only for a period of about 12 weeks yearly.[1]	Only D. & C.[2]
Carriers excluded	All others except C. G. W	No carriers excluded but we can not share the facilities between June 15 and September 10 which is our sailing season.[1]	

[1] Pertains only to space used by Chicago, Duluth & Georgian Bay Transit Co.

[2] Pertains only to space used by Detroit & Cleveland Navigation Co.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Port	Chicago, Ill.—Continued		
Name or number	Canada Atlantic Transit Co. of United States	Great Lakes Transit Corp	Goodrich Transit Co.
Owner	Illinois Central R. R.	do	Michigan Central R. R.
Operator	Canada Altantic Transit Co	do	Goodrich Transit Co.
Exact location	East end Randolph Street viaduct	233 East North Water Street, Chicago River, north side, east of foot of St. Clair Street	Chicago River, south side, east of Michigan Avenue Bridge.
Berthing capacity, feet	500	325	350.
Depth of water alongside, feet.	24	18	26.
Transit shed capacity, square feet.	24,000	None	7,000.
Warehouse capacity, square feet.		40,000	None.
Mechanical facilities	None	None	None.
Principal commodities handled.	Sugar, coffee, burlap, corn, barley, general merchandise.	General merchandise	None.
Conditions of use	Private	Private; receiving and delivering freight	Passenger terminal only.
Carriers permitted to use terminal.	Illinois Central R. R., Canada Atlantic Transit Co.	Great Lakes Transit Corp. only	Goodrich Transit Co., only.
Carriers excluded	All others	All others	All others.

Port	Chicago, Ill.—Continued			
Name and number	Chicago, Rock Island & Pacific Ry.	Chicago, Rock Island & Pacific Ry.	Navy Pier (Goodrich Transit Co.)	The Chicago River & Indiana R. R. Co.
Owner	do	do	City of Chicago	Land: Atchison, Topeka & Santa Fe Ry. Co. Facilities: The Chic. Riv. & Ind. R. R. Co.
Operator	do	do	Goodrich Transit Co.[1]	The Chicago River & Indiana R. R. Co.
Exact location	Chicago River, south branch, east bank, between Taylor and Sixteenth Streets.	C. R. I. & P. slip, One hundred and eighth Street and Calumet River.	Mouth of Chicago River, north side.	Chicago River, West Fork, South Branch, south bank, Twenty-seventh and Robey Streets.
Berthing capacity, feet	3,580	1,050	1,200 [1]	755.
Depth of water alongside, feet	26	20	18	19.
Transit shed capacity, square feet	12,259	30,472	120,000 [1]	Main canopied platform, 11,390; auxiliary platforms, 2,000.
Warehouse capacity, square feet	None	None	120,000 [1]	None.
Mechanical facilities	None	None	None [1]	None.
Principal commodities handled	General merchandise	None, not in use	Package freight and fruit [1]	Bagged flour and feed.
Conditions of use	Restricted	Not in use	Public or private; passenger and freight terminal.[1]	Subject to individual arrangement.

Carriers permitted to use terminal.	Rutland-Lake Michigan Transit Co., Great Lakes Transit Co., Canada-Atlantic Transit Co., Merchants Lighterage Co.	None	Goodrich Transit Co. only [1]	Atchison, Topeka & Santa Fe Ry.; Chicago River & Ind. R. R.; Great Lakes Transit Corporation.
Carriers excluded	All others	Not in use	All others [1]	All others.

Ports	Benton Harbor, Mich.	South Haven, Mich.		
Name or number	Central Dock	Boat Dock	Goodrich Transit Co. Dock	Municipal Dock.
Owner	Goodrich Transit Co	Utilities Operating Co	C. Funk	City of South Haven.
Operator	do	do	Goodrich Transit Co	South Haven Terminal Co.
Exact location	At junction of St. Joseph River and Benton Harbor Canal.	Williams Street and River bridge	Foot of Phoenix Street	Inner end of south pier.
Berthing capacity, feet	500 on St. Joseph River, 1,000 on canal.	480	500	820.
Depth of water alongside, feet	17	16	16	18.
Transit shed capacity, square feet	14,592, 5,040	14,000	3,000	None.
Warehouse capacity, square feet	None	None	None	12,600.
Mechanical facilities	None	None	None	None.
Principal commodities handled	Fruit, machinery, and general merchandise.	Not in use	Fruits and general merchandise	China clay and wood pulp.
Conditions of use	Private	Public	Private	Public.
Carriers permitted to use terminal.	Goodrich Transit Co	All	Goodrich Transit Co	All.
Carriers excluded	All others	None	All others	None.

[1] Pertains only to space used by Goodrich Transit Co.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Michigan*—Continued

Ports	Holland, Mich.	Grand Haven, Mich.	
Name or number	Goodrich Transit Co. Dock	Grand Trunk R. R. Dock	Robbins' Dock.
Owner	Goodrich Transit Co	Grand Trunk R. R	N. Robbins.
Operator	do	Wisconsin & Michigan Transportation Co	Do.
Exact location	Foot of Graham Avenue	North of foot of Washington Street	South of foot of Washington Street.
Berthing capacity, feet	295	300	285.
Depth of water alongside, feet.	18	20	20.
Transit shed capacity, square feet.	12,500	12,500	12,700.
Warehouse capacity, square feet.	None	None	None.
Mechanical facilities	None	None	None.
Principal commodities handled.	Produce and general merchandise	Autos and general merchandise	General merchandise.
Conditions of use	Private	Private	Public.
Carriers permitted to use terminal.	Goodrich Transit Co	Wisconsin & Michigan Transportation Co	Goodrich Transit Co. and Wisconsin & Michigan Transportation Co.
Carriers excluded	All others	All others	None.

Port	Muskegon, Mich.			
Name or number	Goodrich Transit Co. Dock	Wisconsin & Michigan Transportation Co.	Grand Trunk R. R. Dock	Pennsylvania R. R. Dock.
Owner	Goodrich Transit Co	Bauknecht Bros	Grand Trunk R. R	Pennsylvania R. R.
Operator	do	Wisconsin & Michigan lease inner end; Construction Materials Co., outer end.	do	Do.
Exact location	Foot of Goodrich Street	Foot of Eighth Street	Foot of Ninth Street	Foot of Eleventh Street.
Berthing capacity, feet	1,400	350	500	200 east side, 400 west side.
Depth of water alongside, feet	14-20	14-20	13-18	22 east side, 20 west side.
Transit shed capacity, square feet.	16,500	8,880	2,750	12,000.
Warehouse capacity, square feet.	None	None	None	None.
Mechanical facilities	Chain fall crane, hand pull	None	None	None.
Principal commodities handled	Products of Brunswick-Balke-Collender and general merchandise.	General merchandise	Not in use	Lumber on west and package freight on east.
Conditions of use	Private	Private	Public	Interchange with Pennsylvania R. R. only.
Carriers permitted to use terminal.	Goodrich Transit Co	Wisconsin & Michigan Transportation Co.	All having interchange freight	All having interchange freight.
Carriers excluded	All others	All others	All others	All others.

Ports	Ludington, Mich.		Manistee, Mich.	
Name or number	Michigan Transit Corporation Dock.	Pere Marquette Ry. Dock	Pere Marquette Line Steamers Dock.	Michigan Transit Corporation Dock.
Owner	Michigan Transit Corporation	Pere Marquette Ry	Pere Marquette Line Steamers	Michigan Transit Corporation.
Operator	do	Joint operation by Pere Marquette Ry. and Pere Marquette Line Steamers.	do	Do.
Exact location	Foot of Tamco Street	Foot of Donaher Street	Foot of Pine Street	Foot of Pine Street.
Berthing capacity, feet	100 by 200	1,200	270	170.
Depth of water alongside, feet	22-12	21	18	18.
Transit shed capacity, square feet	10,800	19,200	13,850	6,300.
Warehouse capacity, square feet	None	None	None	None.
Mechanical facilities	None	Electric tractor and trailers	None	None.
Principal commodities handled	Out, fruit; in, general merchandise.	Grain and general merchandise	Fresh fruit and general merchandise.	Fruit, general merchandise.
Conditions of use	Private	Private	Private	Private.
Carriers permitted to use terminal.	Michigan Transit Corporation	Pere Marquette Line Steamers	Pere Marquette Line Steamers	Michigan Transit Corporation.
Carriers excluded	All others	All others	All others	All others.

Ports	Frankfort, Mich.	Charlevoix, Mich.	Cheboygan, Mich.
Name or number	Michigan Transit Corporation Dock	O. E. Wilbur Dock	McArthur Coal Dock.
Owner	Michigan Transit Corporation	O. E. Wilbur	McArthur Coal Co.
Operator	do	do	M. D. Olds.
Exact location	Foot of Fourth Street	Foot of Bridge Street	On Cheboygan River at Cheboygan, Mich.
Berthing capacity, feet	200	235	300.
Depth alongside, feet	12	16	18.
Transit shed capacity, square feet.	2,984	6,080	
Warehouse capacity, square feet.	None	None	60,000 tons.
Mechanical facilities	None	None	1 Brown locomotive crane.
Principal commodities handled.	Fresh and canned fruit, south; miscellaneous, north.	Oil, hay, farm produce, merchandise, and fresh fish.	
Condition of use	Private	Public	Chartered vessels unloading; general fueling of vessels.
Carriers permitted to use terminal.	Michigan Transit Corporation	All	
Carriers excluded	All others	None	

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Huron*

Ports	Detour, Mich.		Bay City, Mich.
Name or number	Valley Camp Coal Dock	Pickands-Mather Co. Coal Dock	Aetna Portland Cement Co. Dock.
Owner	Valley Camp Coal Co	Pichands-Mather Co	Aetna Portland Cement Co.
Operator	T. L. Durocher & Co	do	Do.
Exact location	Detour, Mich. (Frying Pan Island)	Detour, Mich	2 miles above mouth of Saginaw River.
Berthing capacity, feet	500	600	500.
Depth alongside, feet	22	22	15.
Warehouse capacity, tons	7,500	15,000	100,000.
Mechanical facilities	1 McMyler whirley	2 McMyler whirleys	2 Brown hoists, 1 locomotive crane.
Principal commodities handled.	Coal		
Conditions of use	Private	Private	Private.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Huron and Lake Erie*

Ports	Port Huron, Mich.		Detroit, Mich.
Name or number	Port Huron Terminal	White Star Line Dock	Iron Street Dock.
Owner	Port Huron Terminal Co	White Star Line	American Bolt Corporation, bondholders' protective committee, Philadelphia, Pa.
Operator	do	do	Nicholson-Universal Steamship Co. and Spokane Steamship Co. jointly.
Exact location	Foot of Tunnel Street	On St. Clair River between Broad Street and Grand River Avenue.	Foot of Iron Street.
Berthing capacity, feet	750	370	380.
Depth alongside, feet	16	20	17.
Transit shed capacity, square feet.	30,000	7,000	400,000.
Warehouse capacity, square feet.	Transit shed used for storage during winter months.	None	400,000.
Mechanical facilities	2-chain escalators, electric, on hinged ramps, for handling 2-wheel trucks to and from vessel; 1 portable 2½-ton gasoline-operated crane; supply of 2-wheel hand trucks and hand-truck bodies; latter used for handling small packages.	2-wheel hand trucks, and 4-wheel trucks, which, when loaded are run aboard vessel and carried to destination; capacity of these trucks 1 and 2 tons.	1 inclined ramp to top deck of vessel.
Principal commodities handled.	Inbound, principally flour and feeds; also butter, cheese, and eggs; and miscellaneous merchandise. Outbound, package freight and automobiles.	General package freight and passengers	Automobiles.
Conditions of use	Used as rail-water transfer terminal, open to all carriers on payment of tariff charges; terminal is privately owned.	Private steamship terminal	Private.

Carriers permitted to use terminal.	This terminal is under contract with Minnesota, Atlantic Transit Co., and the Bay City Steamship Co., to handle their cargoes, ship to car and car to ship, and freight offered by other carriers is only accepted when it does not interfere with the operations of above steamship lines.	When dock is not used by owner, other noncompetitive carriers may use same for discharging passengers.	Own vessel, and noncompetitive vessels by arrangement.
Carriers excluded	None, unless they interfere with the business of the steamship lines having contracts.	Carriers on competitive routes	All others.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Erie*

Port	Detroit, Mich.			
Name or number	Actua Portland Cement Co	White Star Line Dock	Detroit & Cleveland Navigation Co.	Ashley & Dustin's Dock.
Owner	E. W. Bissell estate	White Star Line Navigation Co	do	Detroit & Cleveland Navigation Co.
Operator	Nicholson Universal Steamship Co.	do	do	Ashley & Dustin.
Exact location	Between foot of First and Second Streets.	Foot of Griswold Street	Foot of Third Avenue; foot of First Street extending west of Cass Street, foot of Shelby Street.	East from foot of First Street.
Berthing capacity, feet	367.70	260	1,587 used by themselves; additional frontage rented to others.	170.
Depth alongside, feet	East end, 15; center, 14; west end, 16.	East end, 25; center, 26; west end, 15.	Approximately 16, Third Avenue to Second Avenue; 20 at foot of Cass to east limit.	East end, 28 feet; center, 16 feet; west end, 15 feet.
Transit shed capacity, square feet.	4,625	Two sheds, total 10,000	3,915	5,000.
Warehouse capacity, square feet	19,645	None	Foot of Third Avenue, between Second and Third, 27,904; foot of Wayne Street, west side, 15,912; foot of Wayne Street, east side, 18,800; foot of First Street, extending to foot of Cass Street, 27,182; foot of Shelby Street, 30,000; total, 135,398.	None.
Mechanical facilities	None	1 hand-operated crane, 1-ton capacity; also supply of 4-wheel trucks of 1-ton capacity.	80 hand trucks; 11 electric trucks, 2-ton capacity, which are used also to pull trailer trucks, of which there are 20, 1-ton capacity.	None.
Principal commodities handled	Cement	Assorted package freight and passengers.	Automobiles, iron and steel and general package freight, passengers.	Passengers, small package freight; peaches, grapes, and apples in fall.
Conditions of use	Private	Exclusive use of own steamers	Private	Private.
Carriers permitted to use terminal	Own boats	White Star Line boats	Operator's	Operator's.
Carriers excluded	All others	All others	All others	All others.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Erie*—Continued

Port	Detroit, Mich.—Continued		
Name or number	Detroit, Mich., Public Lighting Commission	Petoskey Portland Cement Co. Dock	Detroit Railway & Harbor Terminals Co. Dock.
Owner	City of Detroit	Petoskey Portland Cement Co	Detroit Railway & Harbor Terminals Co.
Operator	do	do	Do.
Exact location	Foot of Morrell Street	100 feet east of Chene Street	Foot of Clark Avenue.
Berthing capacity, feet	1,000	175	1,400.
Depth alongside, feet	30	East end, 13; west end, 19	22.
Transit shed capacity, square feet.			30,000.
Warehouse capacity, square feet.	125,000 tons on ground	10,000	800,000.
Mechanical facilities	None	2 electric conveyors	Gantry cranes travel full length of dock with 10 tons capacity when fully extended.
Principal commodities handled.	Coal	Cement in bulk and in sack	Automobiles, dairy and other food products, and general merchandise.
Conditions of use	Private	Private	Open to all vessels for the transportation of commodities.
Carriers permitted to use terminal.	Used only to convey coal to this company; this is done by means of self-unloading vessels.	Own boats	
Carriers excluded		All others	

Port	Detroit, Mich.—Continued		
Name or number	Ford Motor Co. Dock	Summit Street Dock	Great Lakes Transit Corporation Dock.
Owner	Ford Motor Co	Nicholson-Universal Steamship Co	Detroit Railway & Harbor Terminals Co.
Operator	do	do	Great Lakes Transit Corporation.
Exact location	Rouge River above Dix Avenue Bridge	4683 West Jefferson Avenue	Foot of McKinstry Avenue.
Berthing capacity, feet	1,500	203	400.
Depth alongside, feet	21	18	25.
Transit shed capacity, square feet.		700,000	
Warehouse capacity, square feet.	1,000,000 tons	700,000	45,000.
Mechanical facilities	2 Huelett unloaders	2 inclined loading ramps to second floor; 3 lift bridges from second floor of warehouse to level of top deck of vessel.	2 steam cranes, each 10 tons; 1 electric crane, 30 tons; 2 electric trucks; 150 hand trucks.
Principal commodities handled.		Automobiles, 85 per cent; package freight, 15 per cent.	Copper, zinc, sugar, dairy products, general merchandise, automobiles and passengers.
Conditions of use	Private	Private	Private.
Carriers permitted to use terminal.		Own vessels, and noncompetitive vessels by arrangement.	Own vessels.
Carriers excluded		All others	All others.

DETROIT RAILWAY & HARBOR TERMINALS CO., DETROIT, MICH.

Port	Toledo, Ohio	
Name or number	Red Star Navigation Co	Nicholson Universal Steamship Co.
Owner	City of Toledo	M. Rabbitt & Sons.
Operator	Red Star Navigation Co	Nicholson Universal Steamship Co.
Exact location	On west side of Maumee River, 1,400 feet above Cherry Street Bridge, foot of Madison Street.	On west side of Maumee River, 300 feet above Pennsylvania R. R. bridge, near foot of Cedar and Elm Streets.
Berthing capacity	331 feet	168 feet.
Depth alongside	12 to 15 feet, at mean lake level	17 to 18 feet, at mean lake level.
Transit shed capacity, square feet	None	None.
Warehouse capacity, square feet	10,184	10,222 first floor; 19,936 second floor.
Mechanical facilities	None	None.
Principal commodities handled	Passengers, baggage, and automobiles	Atuomobiles and package freight.
Conditions of use	Leased to Red Star Navigation Co	Leased to Nicholson Universal Steamship Co.
Carriers permitted to use the terminal	Red Star Navigation Co	Nicholson Universal Steamship Co.
Carriers excluded	All others	All others.

Port	Erie, Pa.	
Name or number	Merchandise Dock	Public dock.
Owner	Pennsylvania R. R	City of Erie.
Operator	do	Do.
Exact location	At foot of Holland Street, Pennsylvania R. R. (Philadelphia & Erie Division).	Peach to French Streets and State Street extended.
Berthing capacity	1,000 feet	Wharf frontage, 1,300 feet; pier, 1,000 feet.
Depth alongside	20 feet	Wharf, 10 to 15 feet; pier, 20 feet.
Transit shed capacity	211,000 square feet	30,000 square feet.
Warehouse capacity, square feet	None	None.
Mechanical facilities	None	None.
Principal commodities handled	Flour, grain, and general merchandise	Lumber, fish, and coal.
Conditions of use	Equal terms to all vessels	Equal terms to all vessels under city ordinances.
Carriers permitted to use terminal	All	All.
Carriers excluded	None	None.

TABLE No. 197.—*Package freight terminals at principal ports on Lake Erie*—Continued

Ports	Ecorse, Mich.	Toledo, Ohio		Cleveland, Ohio
Name or number	Nicholson Terminal & Dock Co	The Western Transit Co	New York Central Coal Dock (Ohio Central Lines).	Detroit & Cleveland Dock.
Owner	do	The Vulcan Realty Co	New York Central R. R. Co	City of Cleveland.
Operator	do	The Western Transit Co	Ashtabula & Buffalo Dock Co	Detroit & Cleveland Navigation Co.
Exact location	West of foot of Great Lakes Avenue.	Between Lagrange and Pine Streets on west side of the Maumee River about 600 feet above the Pennsylvania Ry. bridge.	East side Maumee River between Cherry and Fassett Street bridges.	On lake front, foot of East Ninth street.
Berthing capacity, feet	4,200	203.8	4,210	715.
Depth alongside, feet	24	17	22	20.
Transit shed capacity, square feet		None; open lot, 15,500		None.
Warehouse capacity, square feet	15 acres	8,050	175,000 tons	26,400.
Mechanical facilities	1 electric conveyor, 4 electric cranes, 3 steam cranes.	2-ton loading derrick	Car dumper McMyler, 21; Wellman-Shearer-Morgan, 40.	Electric crane on railroad.
Principal commodities handled	Automoblies, scrap iron, steel iron pipes, sugar.	Automobiles		General merchandise; automobiles and trucks.
Conditions of use	Private	Leased to Western Transit Co	Private	Used exclusively by this company.
Carriers permitted to use terminal.	Own vessels, and other vessels with dockage charge.	The Western Transit Co	N. Y. Central R. R	Do.
Carriers excluded	All others	All others	All others	No space available.

Port	Cleveland, Ohio—Continued		
Name or number	Cleveland & Buffalo Dock	Pennsylvania R. R. Pier No. 20	Pennsylvania R. R. Pier No. 23.
Owner	City of Cleveland	Pennsylvania R. R	Pennsylvania R. R.
Operator	Cleveland & Buffalo Transit Co	do	Great Lakes Transit Corporation.
Exact location	On lake front, foot of East Ninth Street	At mouth of Cuyahoga River, east bank	On lake front, foot of West Ninth Street.
Berthing capacity, feet	700	1,200	600.
Depth alongside, feet	18	20	20.
Transit shed capacity, square feet.	47,500	16,160	10,000.
Warehouse capacity, square feet.		29,240	20,000.
Mechanical facilities	None	None	One small chain hoist.
Principal commodities handled.	General merchandise	General merchandise	General merchandise.
Conditions of use	Used exclusively by operator	Public	Used by Great Lakes Transit Corporation.
Carriers permitted to use terminal.	do	All	Only above company.
Carriers excluded	No transit shed space available	None	All.

Port	Cleveland, Ohio—Continued		
Name or number	Valley Warehouse Co	Baltimore & Ohio R. R. Dock	Pennsylvania R. R. Dock.
Owner	Baltimore & Ohio R. R	Baltimore & Ohio R. R. Co	Pennsylvania R. R. Co.
Operator	do	Valley Warehouse Co	Not operated at present.
Exact location	Main and River Bed Avenues	On west side of river from Baltimore & Ohio R. R. lift bridge to Main Avenue Bridge.	North side of old river bed, 800 feet west of Willow Street Bridge.
Berthing capacity, feet	400	580	5,500.
Depth alongside, feet	14	18	21 to 22.
Transit shed capacity, square feet.	None used		
Warehouse capacity, square feet.	24,500 [1]		
Mechanical facilities	None	2-ton magnet for handling	None.
Principal commodities handled.	All		
Conditions of use	Public	Open to the public at current rates	Not operated at present.
Carriers permitted to use terminal.	All		
Carriers excluded	None		

Port	Cleveland, Ohio—Continued			
Name or number	Baltimore & Ohio R. R. Dock	Cleveland & Buffalo Transit Co. Dock.	Detroit & Cleveland Navigation Co. Dock.	Baltimore & Ohio R. R. Dock.
Owner	Baltimore & Ohio R. R. Co	Cleveland & Buffalo Transit Co	Detroit & Cleveland Navigation Co.	Baltimore & Ohio R. R. Co.
Operator	Valley Warehouse Co	do	do	Do.
Exact location	On west side of river from Main Avenue Bridge to Superior Street viaduct.	On east side of river, 395 feet north of Saint Clair Avenue.	On east side of river, extending north from Superior Street viaduct.	On east side of river, 600 feet south of Big Four R. R. bridge, No. 1.
Berthing capacity, feet	830	245	498	500.
Depth alongside, feet	18	16	15	14 to 16.
Mechanical facilities	2-ton magnet for handling iron and pipe.	None	None	None.
Condition of use	Public dock for miscellaneous freight.	Private dock, not in use	Private dock, used only for storage at present.	Public dock for B. & O. R. R shipments.

[1] Warehouse has not been used for handling lake freight for the past year. Entire space now used for storage purposes, all lake freight handled over open dock.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Erie*—Continued

Port	Cleveland, Ohio—Continued		
Name or number	City Dock	Baltimore & Ohio R. R. Dock	Big Four Dock.
Owner	City of Cleveland	Baltimore & Ohio R. R. Co	New York Central R. R. Co.
Operator	do	do	Do.
Exact location	Foot of East Ninth Street	On east side of river, 300 feet below West Third Street Bridge No. 1.	On east side of river just south of Cincinnati Slip.
Berthing capacity, feet	715	1,310	700.
Depth alongside, feet	20	18	18 to 20.
Mechanical facilities	Electric crane railroad electric equipment	None	None.
Condition of use	Free public dock	Public dock for Baltimore & Ohio R. R. shipments.	Not in use.

Port	Buffalo, N. Y.			
Name or number	New York Central R. R. Ohio Street Station.	Buffalo Lake freight dock	Penn. R. R. Warehouse "C"	Cleveland & Buffalo Transit Co.'s Dock.
Owner	New York Central R. R.	Erie Railroad Co	do	Cleveland & Buffalo Transit Co.
Operator	do	do	Penn. R. R. Co	Do.
Exact location	North side Buffalo River, east of Michigan Avenue, extending to Ohio Basin Slip.	Ohio Street	North of Michigan Ave. Junction of Buffalo Creek and Blackwell Canal.	Foot of Erie Street.
Berthing capacity, feet	2,150	Ohio Street 530 feet, Ganson Street, 708 feet.	610	810.
Depth alongside, feet	23	21–23	20	19.
Transit shed capacity, square feet.	299,000	Ohio Street, first floor 42,600 Ohio Street, second floor 42,600	None	66,000.
Warehouse capacity, square feet		Ohio Street, 85,200	54,927	
Mechanical facilities	Electric conveyor, gravity conveyor, electric tractors, and hand trucks.	Ohio Street, 7 dock carriers, 4 hoisting conveyors.		Gantry crane proposed.
Principal commodities handled	Package freight, flour, feed, sugar, caps, metal, wool, shingles, general merchandise.	Flour, feed, and general merchandise.	Merchandise freight	General merchandise.
Condition of use	Interchange of freight traffic between New York Central R. R. and lake carriers.	Open for interchange traffic with Erie R. R.		
Carriers permitted to use terminal.	Those with whom traffic arrangements for interchange of traffic have been made.	Great Lakes Transit Corporation	Pennsylvania & G. L. Transit Co.	Cleveland & Buffalo Transit Co. and those on which C. & B. gets a haul.
Carriers excluded	Any that have not made traffic arrangements.	All which do not handle traffic in connection with the Erie R. R.	All other	No applicants.

Port	Buffalo, N. Y.—Continued			
Name or number	Union Dock & Warehouse "A"	Buffalo Freight Terminal & Warehouse Corporation No. 1.	Delaware, Lackawanna & Western lake freight house.	Island Warehouse Corporation.
Owner	Keystone warehouse (warehouse proper) (land by Pennsylvania R. R. Co.).	Lehigh Valley R. R. Co	do	Do.
Operator	Keystone Warehouse Co	Buffalo Freight Terminal & Warehouse Corporation.	Detroit & Cleveland Navigation Co.	Do.
Exact location	South side of city ship canal at Michigan Avenue.	City ship canal, left bank, Tifft Farm 2 ¼miles above mouth of Buffalo River.	Buffalo River, right bank, ⅜ mile above mouth.	City ship canal, east bank, 1¼ miles above mouth.
Berthing capacity, feet	1,307 or 3 boats	2,700	860	600.
Depth alongside, feet	22	21	23	23.
Transit shed capacity, square feet.	151,000	180,000	57,000	82,000.
Warehouse capacity, square feet	None	None	None	60,000.
Mechanical facilities	Electric hoist for canal boat unloading.	Hand trucks; 3 electric hoists	None	6 ramp conveyors, 1 shear leg hoist, electrically operated.
Principal commodities handled	Flour and feed	General merchandise, flour and feed.	General merchandise	Flour and feed.
Carriers permitted to use terminals.	Open	Any	Detroit & Cleveland Navigation Co.	Vessels handling grain for Pillsbury Flour Mills.
Carriers excluded	None	None	All others	All others.

Port	Buffalo, N. Y.—Continued			
Name or number	Ohio Basin barge canal terminal	Erie Basin barge canal terminal	Nicholson-Universal Steamship Co. No. 1.	Nicholson-Universal Steamship Co. No. 2.
Owner	State of New York	State of New York	New York Central R. R	Erie R. R.
Operator	do	do	Nicholson-Universal Steamship Co.	Nicholson-Universal Steamship Co.
Exact location	Ohio Basin	Erie Basin, foot of Genesee Street	Michigan Avenue and Buffalo River	405 Ohio Street on Buffalo River at Ohio Basin.
Berthing capacity, feet	2,550	3,408	500	500-575.
Depth alongside, feet	13 [1]	20 [2]	21-23	21-23.
Transit shed capacity, square feet.	None	46,400		
Warehouse capacity, square feet	None	None	65,000	65,000.
Mechanical facilities	2-ton steam tractor crane, 1 full portal 5-ton crane.	15-ton movable portal gantry crane on Pier No. 2; two 3-ton electric semiportal cranes on Pier No. 1; 1 heavy duty revolving caterpillar crane; 2 electric tractors and 2 electric tier lifts, hand trucks, etc., in pier shed; 2-ton steam tractor crane.	None	None.

[1] Depth of 23 feet below mean lake level will be provided at Ohio Basin Jan. 1, 1930. [2] Depth of 23 feet below mean lake level will be provided at Erie Basin Jan. 1, 1930.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Erie*—Continued

Port	Buffalo, N. Y.—Continued			
Principal commodities handled (and quantities).	General merchandise	General merchandise	Autos only 32,000 in 1928	Autos (not used 1929; overflow storage from No. 1).
Condition of use			Private	Private.
Carriers permitted to use terminal.	All vessels carrying cargoes on or for canal.[3]	All vessels carrying cargoes on or for canal.[3]	do	Do.
Carriers excluded	None	None	All others	All others.

Port	Buffalo, N. Y.—Continued		
Name or number	Union Dock & Warehouse "B"	Buffalo Freight Terminal & Warehouse Corporation No. 2.	275 Hamburg Turnpike.
Owner	Pennsylvania R. R	Erie R. R	Terminals & Transportation Corporation of America, Buffalo unit.
Operator	Keystone Warehouse Co	Buffalo Freight Terminal & Warehouse Corporation.	Do.
Exact location	City ship canal, north of Michigan Avenue	Buffalo River at Ganson & Ohio Streets	275 Hamburg Turnpike.
Berthing capacity, feet	250	800	1,500, 450.
Depth alongside, feet	22	21–23	1,500.
Transit shed capacity, square feet.	25,000	80,000	21, 12–14 (incompleted).
Warehouse capacity, square feet.	None	None	
Mechanical facilities	Electric hoist	Hoists	1 auto ramp; 4 conveyors (electric).
Principal commodities	Flour and feed	Grain products and automobiles	Sugar, flour, feed, autos, lumber. Perishable freight, such as butter, eggs, cheese, etc.
Condition of use	Open	Public	Public.
Carriers permitted to use terminal.	All	All	Operated by Terminals & Transportation Corporation.
Carriers excluded	None	None	None.
Remarks			6,000 feet railroad tracks on premises served by Lehigh Valley switching connection to all rail lines.

[3] Other vessels may use terminal as port of call under permit of commissioner of canal.

Ports	Tonawanda, N. Y.	North Tonawanda, N. Y.
Name or number	1	1.
Owner	New York State	New York State.
Operator	do	Do.
Exact location	South Niagara Street	Sweeney Street.
Berthing capacity, feet	940	800.
Depth alongside, feet	14	14.
Transit shed capacity, square feet	2,560	2,400.
Mechanical facilities	None	1 2.5-ton stiff leg derrick.
Principal commodities handled	General merchandise	General merchandise.
Conditions of use	Free for canal freight interchange	Free for canal freight interchange.
Carriers permitted to use terminal	All	All.
Carriers excluded	None	None.

TABLE NO. 197.—*Package freight terminals at principal ports on Lake Ontario*

Ports	Ogdensburg, N. Y.	Oswego, N. Y.	
Name or number	Rutland R. R. freight houses	New York, Ontario & Western R. R. freight house.	New York State.
Owner	Rutland R. R. Co	New York, Ontario & Western R. R	Do.
Operator	do	do	Do.
Exact location	North of foot of Patterson Street	Foot of East Second Street, adjacent coal trestle	West side terminal at foot of West First Street.
Berthing capacity, feet	500 at each transit shed	400	1,000 by 150.
Depth alongside, feet	19	20	25.
Transit shed, capacity, square feet.	Eastbound house, 50,000; westbound house, 42,500.	18,200	12,400.
Warehouse capacity, square feet.	None	None	12,400.
Mechanical facilities	None	None	All electric facilities, one 5-ton full portable crane.
Principal commodities handled.	Eastbound, canned goods, feed, and autos; westbound, high-grade general merchandise.	Paper pulp	General merchandise.
Conditions of use	Public	Public	Free interchange of canal freight.
Carriers permitted to use terminal.		Private	All.
Carriers excluded	None	None	None.
Remarks	Not in use for past 3 years.		

PACKAGE-FREIGHT LINES

Interlake services.—There are 12 package-freight lines operating regular interlake services on the Great Lakes. From Lake Superior there are 7 lines, 1 to Lake Ontario, 2 to Georgian Bay, and 4 to Lake Erie ports. One of the latter lines also operates a service to the Atlantic Ocean via the New York Barge Canal. From Lake Michigan there are 8 lines operating services, 2 to Georgian Bay ports, 5 to Lake Erie ports, and 1 to Lake Superior ports.

In addition to these regular services, there are tramp ships which engage in the package-freight trade, giving service between all ports on the Lakes when cargo offers.

Intralake services.—There are 10 lines operating regular intralake services on the Great Lakes. Of these Lake Superior has 1 service between Canadian and American ports.

Lake Michigan has 5 lines operating between its various ports. Of these, 4 are translake, the other plying between adjacent ports on the west shore. Lake Huron has 2 lines operating between Georgian Bay ports and Sault Ste. Marie.

Of the 3 lines on Lake Erie, 2 serve American ports exclusively, while the other operates translake between American and Canadian ports.

The following maps show the routes and ports of call of package freight line services in inter and intralake trades.

F

PRINCIP

LINES

SUBMITTED:

W. E. Grac

CHIEF STATISTICIA

Data By_J.J

WAR DEPARTMENT.

CORPS OF ENGINEERS, U.S. ARMY.

PRINCIPAL
INTRALAKE PACKAGE FREIGHT LINES

Lake Superior Lines

1. United States & Dominion Transportation Co.

Lake Michigan Lines

1. Goodrich Transit Co.
2. Michigan Transit Corp.
3. Pere Marquette Line Steamers.
4. Wisconsin & Michigan Transportation Co.
5. Goodrich-West Ports S. S. Co.

Lake Huron Lines

1. Georgian Bay Tourist Co.

Lake Erie Lines

1. Cleveland & Buffalo Transit Co.
2. Ashley & Dustin Steamer Line.
3. Spokane S. S. Co.

Lake and River St. Claire

1. White Star Navigation Co.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

PRINCIPAL INTRALAKE PACKAGE FREIGHT LINES ON THE GREAT LAKES

Scale of Miles
0 20 40 60 80 100

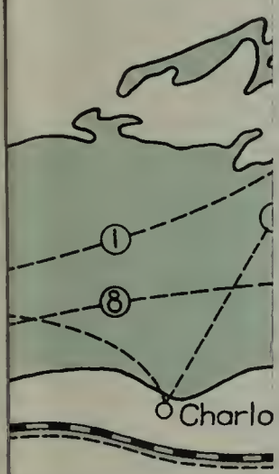
SUBMITTED: W. C. Gravier
CHIEF STATISTICIAN

APPROVED: J. J. Young
MAJOR, CORPS OF ENGINEERS, U.S.A.

Data By W.W.L.

Drawn By M.E.P.

WILLIAMS & HEINTZ CO., WASH. D.C.



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WAR DEPARTMENT.

CORPS OF ENGINEERS, U.S.ARMY.

PRINCIPAL INTERLAKE PACKAGE FREIGHT LINES ON GREAT LAKES

1. Canada Steamship Lines.
2. Canadian Pacific Railway Steamship Lines
3. Northern Navigation Co.
4. Chicago, Duluth & Georgian Bay Transit Co.
5. Western Transit Co.
6. Canada-Atlantic Transit Co.
7. Great Lakes Transit Corp.
8. Rutland-Lake Michigan Transit Co.
9. Detroit & Cleveland Navigation Co.
10. Minnesota-Atlantic Transit Co.
11. Nicholson Universal Steamship Co.
12. Dominion Transportation Co.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

PRINCIPAL INTERLAKE PACKAGE FREIGHT LINES ON THE GREAT LAKES

Scale of Miles
0 20 40 60 80 100

SUBMITTED: W. E. Graves
CHIEF STATISTICIAN

APPROVED: J. J. Ivory
LT. COL., CORPS OF ENGINEERS, U.S.A.

Data By J.J.L.

Drawn By O.D.V. & E.L.G.

WILLIAMS & HEINTZ CO. WASH. D.C.

X. CAR-FERRY TRAFFIC

ROUTES

This method of transportation on the Great Lakes was inaugurated on November 15, 1892, by the Ann Arbor Railroad Co. when the first car ferry of wooden construction made a trip across Lake Michigan between Frankfort, Mich., and Kewaunee, Wis. Since 1892 car ferriage on the Great Lakes and connecting waterways has steadily increased, until at present there are 3 lines operating on Lake Michigan, 4 on the Detroit River, 3 on Lake Erie, 1 on the Straits of Mackinac, 1 on the St. Clair River, 1 on Lake Ontario, and 1 on the St. Lawrence River. All of the car ferries now in operation are of the same general type as the original wooden vessels except that they are constructed of steel and are of greater capacity.

Lake Michigan.—The present service on Lake Michigan, which is by far the most extensive of its kind in the world, consists of 4 ferries operated between Grand Haven, Mich., and Milwaukee, Wis., by the Grand Trunk Railway; 9 between Ludington, Mich., and Milwaukee, Manitowoc and Kewaunee, Wis., by the Pere Marquette Railway; 6 between Frankfort, Menominee, and Manistique, Mich., and between Frankfort, Mich., and Manitowoc and Kewaunee, Wis., by the Ann Arbor Railroad.

Lake Erie.—While car ferriage on Lake Erie is not as extensive as that on Lake Michigan, it is very important, inasmuch as direct connection is made between American and Canadian shores, forming a short link between the Pennsylvania coal and steel districts and an important consuming market. The services are: One operated between Ashtabula, Ohio, and Port Maitland, Ontario, by the Toronto, Hamilton & Buffalo Navigation Co.; 1 between Ashtabula, Ohio, and Port Burwell, Ontario, by the Pennsylvania & Ontario Transportation Co.; 2 between Conneaut, Ohio, and Port Stanley, and Rondeau Harbor, Ontario, by the Marquette and Bessemer Dock & Navigation Co.

Other.—Between Detroit, Mich., and Windsor, Ontario, 6 car ferries are operated by 4 railroads—1 by the Grand Trunk Railway, 2 by the Wabash Railway, 2 by the Canadian Pacific Railway, and 1 by the Pere Marquette Railroad. Those of the Grand Trunk and Wabash Railways are used in conjunction with passenger-train service. The ferry of the former transfers four trains daily in each direction.

The Mackinac Transportation Co. operates 2 car ferries across the Straits of Mackinac between Mackinaw City and St. Ignace,

Mich.; the Pere Marquette Railroad Co., 1 across the St. Clair River between Port Huron, Mich., and Sarnia, Ontario; across Lake Ontario, between Charlotte (Rochester), N. Y., and Cobourg, Ontario, 2 car ferries are operated by the Ontario Car Ferry Co.; the Canadian Pacific Car & Passenger Transfer Co. (Ltd.), 1 across the St. Lawrence River between Ogdensburg, N. Y., and Prescott, Ontario.

The car-ferry routes are shown on a map facing page 408.

VESSELS

An analysis of Table No. 198 shows that there are 35 car ferries in active service and 2 in reserve, making a total of 37. Of the total active, 19 operate on Lake Michigan, 6 on the Detroit River, 4 on Lake Erie, 2 on Lake Ontario, 2 on the Straits of Mackinac, 1 on the St. Clair River and 1 on the St. Lawrence River.

All the car ferries operating on Lake Michigan are constructed of steel. The capacities range from 20 to 30 cars. Although primarily built to transport cars from port to port, these vessels carry from 15 to 20 automobiles on the stern without loss of railroad-car capacity, and in addition are equipped with comfortable modern passenger accommodations. Two of the latest type of car ferries were launched by the Pere Marquette Railway during the past year to operate between Ludington, Mich., and points in Wisconsin. These vessels are to be driven at a rate of 18 miles per hour by turbine electric propulsion equipment, the first application of electric drive to this type of craft, and will effect a reduction in the time consumed in shipping by this route. Each boat has a draft of approximately 16 feet, and will be designed to carry 30 standard freight cars. On the more recent ferries the cabin, stateroom, and other deck housings are all steel, and the vessels are equipped with radio and various other modern devices to make them safe for deep-water navigation. It is interesting to note that these car ferries are so designed that service, is maintained during the entire year, despite the adverse climatic conditions.

The table shows that of the 6 active ferries operating across the Detroit River, 1 is constructed of iron and 5 of steel, 2 of which are of stern paddle-wheel propulsion and 1 a sidewheeler. These vessels range from 265 to 326 feet in length with capacities varying between 14 and 24 cars.

The car ferries on Lake Erie do not operate during the entire year, although service is continued for a period after the close of general lake navigation. The business is devoted almost entirely to the carriage of railroad cars. On Lake Ontario the ferries operate during the entire year and carry passengers during the summer months. The car ferries in service across the Straits of Mackinac and on the St. Lawrence River operate during the entire year.

"CITY OF SAGINAW 31," THE NEW CAR FERRY OF THE PERE MARQUETTE RAILROAD

TABLE NO. 198.—*Car ferries*

Name	Owner	Operator	Material and type	Length, B. P.	Breadth molded	Depth molded	Gross tonnage	Capacity (cars)	Place of operation
				Ft. in.	*Ft. in.*	*Ft. in.*			
Ann Arbor No. 3	Ann Arbor R. R	Ann Arbor R. R	Steel—twin screw	307 0	52 0	18 6	2,047	24	Lake Michigan.
Ann Arbor No. 4	do	do	do	259 0	52 0	19 0	1,778	20	Do.
Ann Arbor No. 5	do	do	do	361 3	56 0	21 0	2,884	30	Do.
Ann Arbor No. 6	do	do	do	338 0	56 0	20 6	2,716	26	Do.
Ann Arbor No. 7	do	do	do	348 0	56 0	21 6	2,934	28	Do.
Wabash	do	do	do	366 0	57 6	21 6	3,336	30	Do.
Grand Haven	Grand Trunk Ry	Grand Trunk Ry	do	306 0	54 0	20 0	2,320	24	Do.
Grand Rapids	do	do	do	348 0	56 0	21 6	2,942	28	Do.
Madison	do	do	do	348 0	56 0	21 6	2,942	28	Do.
Milwaukee	do	do	do	338 0	56 0	19 6	2,933	26	Do.
Pere Marquette No. 15	Pere Marquette Ry	Pere Marquette Ry	do	337 1	56 0	17 0	2,443	26	Do.
Pere Marquette No. 17	do	do	do	338 0	56 0	19 6	2,775	26	Do.
Pere Marquette No. 18	do	do	do	338 0	56 0	20 6	2,777	26	Do.
Pere Marquette No. 19	do	do	do	338 0	56 0	19 6	2,626	26	Do.
Pere Marquette No. 20	do	do	do	338 0	56 0	19 6	2,626	26	Do.
Pere Marquette No. 21	do	do	do	348 0	56 0	21 6	2,992	28	Do.
Pere Marquette No. 22	do	do	do	348 0	56 0	21 6	2,985	28	Do.
City of Saginaw 31	do	do	do	381 0	57 0	22 6	3,327	30	Do.
City of Flint 32	do	do	do	381 ½	57 6	22 6	3,327	30	Do.
Detroit	Wabash Ry	Wabash Ry	do	284 0	64 0	19 6	2,089	18–21	Detroit River.
Huron [1]	Grand Trunk Ry	Grand Trunk Ry	Iron—twin screw	238 5	53 9	12 8	1,052	13	Do.
Lansdowne	do	do	Iron—screw	294 0	41 3	13 0	1,571	14–16	Do.
Michigan	Canadian Pacific Ry. Co	Canadian Pacific Ry. Co	Steel—paddle (stern)	296 6	41 4	15 7	1,730		Do.
Ontario	do	do	do	297 0	41 4	14 10	1,615		Do.
Pere Marquette No. 14	Pere Marquette Ry	Pere Marquette Ry	Steel—twin screw	326 0	52 0	21 0	2,531	24	Do.
Transfer	Wabash Ry	Wabash Ry	Steel—side-wheel	265 0	45 6	17 0	1,511	18	Do.
Transport [1]	do	do	do	254 0	46 0	14 0	1,594		Do.
Ashtabula	Pennsylvania & Ontario Transportation Co.	Pennsylvania & Ontario Transportation Co.	Steel—twin screw	338 0	56 0	20 6	2,670	26–28	Lake Erie.
Maitland No. 1	Toronto, Hamilton & Buffalo Navigation Co.	Toronto, Hamilton & Buffalo Navigation Co.	Steel—Screw	338 0	56 0	20 6	2,757	26–28	Do.
Marquette & Bessemer No. 1	Marquette & Bessemer Dock & Navigation Co.	Marquette & Bessemer Dock & Navigation Co.	do	241 0	43 0	21 6	1,732		Do.
Marquette & Bessemer No. 2	do	do	Steel—twin screw	338 0	56 0	19 6	2,583	26–28	Do.
Chief Wawatam	Mackinac Transportation Co.	Mackinac Transportation Co.	do	332 0	62 0	25 0	2,990	18	Straits of Mackinac.
Sainte Marie	do	do	Steel—screw	232 0	62 0	25 0	2,383	18	Do.
Ontario No. 1	Ontario Car Ferry Co	Ontario Car Ferry Co	do	306 0	54 0	20 6	5,146		Lake Ontario
Ontario No. 2	do	do	do	307 6	54 0	20 6	5,568		Do.
International	Pere Marquette Ry	Pere Marquette Ry	Wood and iron—twin screw.	210 0	40 0	12 8	851	15	St. Clair River.
Charles Lyon	Canadian Pacific Car & Passenger Transfer Co. (Ltd.).	Canadian Pacific Car & Passenger Transfer Co. (Ltd.).	Steel—screw	248 0	40 0	22 0	1,658	12	St. Lawrence River.

[1] Not in active service, held in reserve.

TERMINALS

Table No. 199 presents data on the car-ferry terminals on the Great Lakes and connecting waterways. At all of the terminals the loading and unloading is carried on over a counterbalanced apron, upon which tracks are laid, connecting the shore end of the slip with the stern of the ferry.

TABLE NO. 199.—*Car-ferry terminals*

Port	Manistique, Mich.	Menominee, Mich.	Kewaunee, Mich.	Manitowoc, Wis.
Owner	Ann Arbor R. R	Ann Arbor R. R	Kewaunee, Green Bay & Western R. R.	Chicago & North Western Ry.
Location	Right bank of Manistique River	Left bank of Menominee River	Left bank of north branch of Kewaunee River.	Right bank of Manitowoc River.
Depth of water, feet	18	19	19	21.
Rail connection	Manistique & Lake Superior Ry	Wisconsin & Michigan—Chicago & North Western—Chicago, Milwaukee, St. Paul & Pacific.	Kewaunee, Green Bay & Western R. R.	Chicago & North Western Ry.
Storage capacity adjacent, cars	100	75		
Port	Manitowoc, Wis	Milwaukee, Wis	Milwaukee, Wis	Grand Haven, Mich.
Owner	Minneapolis, St. Paul & Sault Ste. Marie Ry.	Grand Trunk Ry	Pere Marquette Ry	Grand Trunk Ry.
Location	Left bank of Manitowoc River	Right bank of Kinnickinnick River	Left bank of Kinnickinnick River	Upper end of harbor.
Depth of water, feet	21	19	20	18-20.
Rail connection	Minneapolis, St. Paul & Sault Ste. Marie Ry.	Chicago & North Western—Chicago, Milwaukee, St. Paul & Pacific.	Chicago, Milwaukee, St. Paul & Pacific R. R.	Grand Trunk Ry.
Storage capacity adjacent, cars		100	135	
Port	Ludington, Mich	Frankfort, Mich	Port Huron, Mich	Detroit, Mich.
Owner	Pere Marquette Ry	Ann Arbor R. R	Pere Marquette Ry	Grand Trunk Ry.
Location	East side of north end of Pere Marquette Lake.	South side of harbor	On St. Clair River	On Detroit River.
Depth of water, feet	20	20	11	20.
Rail connection	Pere Marquette Ry. There are 2 car-ferry slips at this location.	Ann Arbor R. R. There are 2 car-ferry slips at this location.	Pere Marquette Ry	Grand Trunk Ry.
Port	Detroit, Mich	Ashtabula, Ohio	Ashtabula, Ohio	Conneaut, Ohio.
Owner	Wabash R. R	New York Central R. R	Pennsylvania R. R	Marquette & Bessemer Dock & Navigation Co.
Location	On Detroit River	On east side of Ashtabula River	On west side of Ashtabula River	On west side of Conneaut River.
Depth of water, feet	20	21	21	20.
Rail connection	Wabash R. R. Car ferries operated by Pere Marquette and Canadian Pacific R. R. use this terminal.	New York Central R. R	Pennsylvania R. R	Bessemer & Lake Erie R. R.
Storage capacity, cars			100	60.
Port	Charlotte (Rochester), N. Y	Ogdensburg, N. Y	Conneaut, Ohio	Milwaukee.
Owner	Buffalo, Rochester & Pittsburgh R. R.	New York Central R. R	Marquette & Bessemer Dock & Navigation Co.	City of Milwaukee.[1]
Location	On west bank of Genesee River	On west side upper entrance channel.	South end Dock No. 1	Right bank of Kinnickinnick River.
Depth of water, feet	20	15	22	22.
Rail connection	Buffalo, Rochester & Pittsburgh R. R.	New York Central R. R	Bessemer & Lake Erie R. R	Chicago & North Western Ry.
Storage capacity, cars	200	14	30	275.

[1] Leased to Pere Marquette for 20 years.

TRAFFIC

From the data contained in the annual report of the Chief of Engineers, supplemented by information received through the courtesy and cooperation of the rail carriers operating car ferries on the Great Lakes and connecting waterways, it is possible to present in this report statistics showing the movement of commerce by car ferry on Lakes Michigan, Erie, Ontario, and the St. Lawrence River during the calendar year 1928. Figures for the business on the Detroit and St. Clair Rivers and the Straits of Mackinac are not available.

These tables show that the total commerce in all directions amounted to 8,141,863 short tons. Of this total, 5,153,329 tons, or 63.3 per cent, represented the traffic on Lake Michigan. Lake Erie ferries were second with 1,072,543 tons, or 13.2 per cent. The St. Lawrence River ranked third with 1,172,300 tons, or 14.4 per cent, followed by Lake Ontario line with 743,691 tons, or 9.1 per cent.

An analysis of the traffic on Lake Michigan shows that the westbound movement was the heavier, being 293,849 tons in excess of the eastbound. Hard and soft coal constituted 51.3 per cent of the westbound business, 1,396,756 tons having been transported. Miscellaneous package freight of 573,386 tons, or 21.0 per cent, was second, while salt with 167,701 tons, or about 6.2 per cent was third. The eastbound traffic was 2,429,740 tons. Of this total, 745,815 tons of miscellaneous package freight comprised 30.7 per cent. Lumber was next with 672,155 tons, or 26.8 per cent. Grain, flour, and feed amounted to 560,380 tons, or 23.1 per cent.

On Lake Erie the exports to Canada amounted to 986,165 tons, or 91.9 per cent of the car-ferry traffic. Of this total, 756,059 tons, or 77 per cent, was coal and coke. Iron and steel, manufactured, ranked next with 145,188 tons, or 14.7 per cent. Miscellaneous package freight was third with 14,265 tons, or 1.4 per cent. The import business amounted to 86,378 tons. Paper amounting to 61,502 tons constituted 71.2 per cent of the total. Ferro silicon was second with 7,470 tons, or 8.6 per cent, followed by asbestos with 4,298 tons, or 5.0 per cent.

From the accompanying tables, regarding traffic across the St. Lawrence River, it will be seen that the exports were a little over three times the imports, amounting to 894,814 tons, or 76.3 per cent. Bituminous and anthracite coal, 852,505 tons, comprised 95.3 per cent of the exports, the former amounting to 802,844 tons and the latter to 49,661 tons. Miscellaneous package freight principally, with cotton and oats in small quantities, made up the remainder, 42,309 tons, or about 4.7 per cent. Of the imports, lumber and paper products, 199,892 tons, comprised 72 per cent. Flour and grain, 41,533 tons, or 14.9 per cent, was second, followed by miscellaneous package freight with 22,726 tons, or 8.2 per cent.

On Lake Ontario exports amounted to 536,439 tons and imports 207,252 tons. The former constituted 72.1 per cent of the entire car-ferry traffic. As on Lake Erie and the St. Lawrence River, bituminous coal was the ranking export with 348,750 tons, or 65 per cent. Anthracite coal to the amount of 138,480 tons, or 25.8 per cent, was second, followed by salt with 28,680 tons, or 5.3 per cent. Of the imports, 158,508 tons of pulpwood accounted for 76.5 per cent while 16,744 tons of lumber amounted to 8.8 per cent. Feldspar was third with 16,680 tons, or about 8.5 per cent.

TABLE No. 200.—*Car-ferry traffic westbound on Lake Michigan during the calendar year 1928*

[Quantities in short tons]

From—	Commodities	To—					Amount
		Manistique	Menominee	Kewaunee	Manitowoc	Milwaukee	
Frankfort:							
Ann Arbor R. R.	Automobiles	1,257	9,258	46,242	4,840	----------	61,597
	Coal, hard and soft	55,975	110,600	73,273	216,368	----------	456,216
	Iron and steel, manufactured.	2,294	3,555	3,180	16,228	----------	25,257
	Salt	1,425	10,267	4,887	13,135	----------	29,714
	Unclassified	13,037	40,898	47,413	101,534	----------	202,882
Total		--------	--------	--------	--------	----------	775,666
Ludington:							
Pere Marquette Ry.	Automobiles	--------	--------	995	13,069	17,893	31,957
	Coal, hard and soft	--------	--------	26,537	201,740	510,513	738,790
	Iron and steel, manufactured.	--------	--------	1,349	44,622	53,174	99,145
	Lime and cement	--------	--------	4,582	56,946	49,096	110,624
	Salt	--------	--------	2,893	66,209	68,885	137,987
	Sand, stones, and marble	--------	--------	--------	33,262	19,682	52,944
	Soda ash and chemicals	--------	--------	--------	24,403	29,538	53,941
	Unclassified	--------	--------	7,778	96,455	88,459	192,692
Total		--------	--------	--------	--------	----------	1,418,080
Grand Haven:							
Grand Trunk Ry.	Automobiles and parts	--------	--------	--------	--------	32,695	32,695
	Coal, hard and soft	--------	--------	--------	--------	201,750	201,750
	Dairy products	--------	--------	--------	--------	5,210	5,210
	Iron and steel, manufactured.	--------	--------	--------	--------	21,750	21,750
	Paper	--------	--------	--------	--------	75,335	75,335
	Wood pulp	--------	--------	--------	--------	15,291	15,291
	Unclassified	--------	--------	--------	--------	177,812	177,812
Total		--------	--------	--------	--------	----------	529,843
Grand total		73,988	174,578	219,129	888,811	1,367,083	2,723,589

TABLE NO. 201.—*Car-ferry traffic eastbound on Lake Michigan during the calendar year 1928*

[Quantities in short tons]

From—	Commodities	To—			Amount
		Grand Haven, Grand Trunk Ry.	Ludington, Pere Marquette R. R.	Frankfort, Ann Arbor R. R.	
Manistique	Automobiles			2,551	2,551
	Flour and feed			1,185	1,185
	Lumber			59,422	59,422
	Unclassified			100,171	100,171
Total					163,329
Menominee	Automobiles			14,065	14,065
	Flour and feed			39,076	39,076
	Grain			1,436	1,436
	Lumber			110,941	110,941
	Unclassified			80,616	80,616
Total					246,134
Kewaunee	Automobiles			3,176	3,176
	Dairy products		10,253		10,253
	Flour and feed		17,922	50,801	68,723
	Grain		3,513	8,219	11,732
	Lumber and forest products		32,392	38,274	70,666
	Paper		1,343		1,343
	Unclassified		14,658	72,439	87,097
Total					252,990
Manitowoc	Automobiles				5,545
	Dairy products		15,234		15,234
	Flour and feed		50,372	38,555	88,927
	Grain		24,421	39,191	63,612
	Iron and steel, manufactured		23,678		23,678
	Lumber and forest products		189,186	43,252	232,438
	Machinery and implements		10,389		10,389
	Malt		17,241		17,241
	Paper		18,363		18,363
	Unclassified		84,892	161,217	246,109
Total					721,536
Milwaukee	Automobiles and parts	109,770			109,770
	Dairy products	11,652	11,852		23,504
	Flour and feed		81,808		81,808
	Grain	162,110	42,956		205,066
	Iron and steel, manufactured	22,212	85,052		107,264
	Lumber and forest products	119,756	78,932		198,688
	Machinery and implements		24,925		24,925
	Malt		13,085		13,085
	Meat	38,896			38,896
	Paper		10,923		10,923
	Unclassified	134,300	97,522		231,822
Total					1,045,751
Grand total		598,696	960,912	870,132	2,429,740

TABLE NO. 202.—*Car-ferry traffic on Lake Erie during the calendar year 1928*

[Quantities in short tons]

IMPORTS

To—	From— Port Burwell and Port Maitland, Ontario	From— Rondeau and Port Stanley, Ontario
Ashtabula, Ohio:		
Asbestos, refuse, and fiber	4,298	----------
Lumber	2,958	----------
Paper	61,502	----------
Aluminum	290	----------
Manganese	3,276	----------
Rubber scrap	271	----------
Shins, calf	672	----------
Ferro silicon	7,470	----------
Scrap tin	1,203	----------
Miscellaneous package	4,120	----------
Total	86,060	----------
Conneaut, Ohio:		
Miscellaneous	----------	38
Crushed rock	----------	115
Fence posts	----------	61
Matches	----------	12
Moulding sand	----------	56
Power shovel and parts	----------	36
Total	----------	318
Grand total	86,060	318

EXPORTS

Ashtabula, Ohio:		
Automobiles	3,629	----------
Brick, fire and clay	3,770	----------
Coal, bituminous	536,079	----------
Coal, anthracite		
Coke		
Steel, manufactured	110,007	----------
Machinery	3,244	----------
Rubber goods	1,112	----------
Sand	1,755	----------
Stone	2,135	----------
Asphaltum	10,059	----------
Lard	1,141	----------
Miscellaneous package	14,216	----------
Total	687,147	----------
Conneaut, Ohio:		
Coal, bituminous	----------	204,214
Coke	----------	15,766
Steel, manufactured	----------	35,181
Fire clay	----------	2,745
Machinery	----------	607
Steam shovels	----------	366
Miscellaneous	----------	139
Total	----------	299,018
Grand total	687,147	299,018
Total imports and exports	----------	1,072,543

TABLE NO. 203.—*Car-ferry traffic on St. Lawrence River during the calendar year 1928*

[Quantities in short tons]

Imports		Exports	
To Ogdensburg, N. Y.	From Prescott, Ontario	From Ogdensburg, N. Y.	To Prescott, Ontario
Barley	20,678	Coal, anthracite	49,661
Flour	18,430	Coal, bituminous	802,844
Oats	2,150	Cotton	3,255
Oriental merchandise	1,882	Oats	2,923
Raw silk	5,136	Miscellaneous package	36,131
Rye	65		
Wheat	210		
Cattle	3,607		
Pulpwood	65,617		
Wood pulp	38,293		
Milk and cream	1,662		
Newsprint paper	58,328		
Fish	1,038		
Shingles, lumber, lath, and pickets	33,814		
Shavings	3,840		
Miscellaneous package	22,726		
Total	277,486	Total	894,814
		Total imports and exports	1,172,300

TABLE NO. 204.—*Car-ferry traffic on Lake Ontario during the calendar year 1928*

[Quantities in short tons]

Imports		Exports	
To Charlotte, N. Y.	From Cobourg, Ontario	From Charlotte, N. Y.	To Cobourg, Ontario
Asbestos	114	Apples	28
Barrels	91	Bottles	20
Bottles	5	Brick	2,288
Bags	30	Bath tubs	84
Canned Vegetables	40	Livestock	36
Dishes	12	Drums	16
Dowels	120	Canned goods	220
Fibre	65	Castings	200
Feldspar	16,680	Feldspar	180
Granite	18	Flue lining	24
Hides	9	Insecticide	19
Lath	56	Glass tanks	23
Lumber	16,744	Glassware	48
Machinery	24	Grease	36
Merchandise	550	Household goods	8
Miscellaneous	225	Merchandise	2,470
Paper	10,700	Lime	34
Photo material	1,040	Machinery	341
Pulpwood	158,508	Mustard	19
Christmas trees	15	Oil	1,904
Rags	34	Pickles	25
Soda	22	Photo material	1,460
Steel drums	56	Rags	578
Shavings and sawdust	84	Salt	28,680
Talc	600	Sand	46
Vegetables	20	Sewer pipe	3,000
Wood pulp	1,144	Snow plows	34
Brick	144	Pulpwood	28
Household goods	32	Wheels	200
Cans	16	Soda	66
Scrap iron	30	Shavings	14
Clay products	24	Tubing	34
		Lumber	56
		Miscellaneous	6,439
		Iron and steel	120
		Paper	75
		Plaster	100
		Furniture	14
		Ivory waste	168
		Coal:	
		Anthracite	138,480
		Supply	195,600
		Commercial bituminous	153,150
Total	207,252	Total	536,439
		Total imports and exports	743,691

CONNECTING RAILROADS

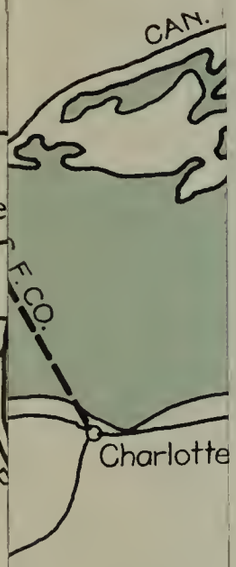
A map has been prepared especially for this report showing the car-ferry routes on the Great Lakes and the rail lines of which the ferries are connecting links.

At Manistique the car ferries operated by the Ann Arbor Railroad connect with the Manistique & Lake Superior Railway, which in turn has connection with the Minneapolis, St. Paul & Sault Ste. Marie Railway (Soo Line). Practically all of the car-ferry commerce at this port is received from and delivered to the latter railroad. At Menominee the Ann Arbor ferries make connection with the Chicago & North Western Railway, the Chicago, Milwaukee, St. Paul & Pacific, and Wisconsin & Michigan Railroads. At Kewaunee the Ann Arbor and Pere Marquette ferries have connection with the Kewaunee, Green Bay & Western Railroad, which in turn connects with the Chicago & North Western; Chicago, Milwaukee, St. Paul & Pacific; and the Green Bay & Western at Green Bay. Manitowoc is the eastern terminus of a branch of the Soo Line, and has direct connection with the Chicago & North Western. Indirect connection at this port is had with the Ann Arbor and the Pere Marquette Railroads via car ferries from Frankfort and Ludington, respectively. At Milwaukee, the Pere Marquette car ferries from Ludington and those of the Grand Trunk from Grand Haven, have connection with the Chicago, Milwaukee, St. Paul & Pacific, Chicago & North Western, and Soo Line. The Michigan Central and Pennsylvania Railroads serve Mackinaw City and the car ferries of the Mackinac Transportation Co. make connection with the Duluth, South Shore & Atlantic Railway at St. Ignace.

The Pere Marquette and the Canadian National Railways reach Sarnia, Ontario, and the car ferry operated by the former railroad connects with this carrier at Port Huron. Windsor, Ontario, is reached by the Pere Marquette, Wabash, and Grand Trunk Railways and the Canadian Pacific Railroad. The car ferries owned by the first three-named carriers connect with these railroads at Detroit. The Canadian Pacific ferries make connection with the Wabash at Detroit.

Two of the car ferries operating across Lake Erie, indirectly connect the Pennsylvania and New York Central Railroads at Ashtabula, with the Canadian Pacific at Port Burwell, and the Toronto, Hamilton & Buffalo Railway at Port Maitland, Ontario. Conneaut is reached by the Bessemer & Lake Erie Railroad and the car ferries of the Marquette, and Bessemer Dock & Navigation Co., operating from this port, make connection with the Pere Marquette at Rondeau, and the London & Port Stanley Railway at Port Stanley, Ontario.

The car ferries operating across Lake Ontario connect with the Buffalo, Rochester & Pittsburgh Railway at Charlotte (Rochester) on the American side and with the Canadian National Railways at Cobourg on the Canadian side. Ogdensburg is served by the New York Central, which connects with the Canadian Pacific at Prescott, Ontario, via car ferry.



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W. E.
CHIEF STAT
Data B

WAR DEPARTMENT.

CORPS OF ENGINEERS, U.S.ARMY.

EXPLANATION

CAR FERRIES ------

C.P.C.P.T. CO	CAN. PAC. CAR & PASSENGER TRANSFER CO., LTD.
O.C.F. CO.	ONTARIO CAR FERRY CO.
T.H.B.N. CO.	TORONTO, HAMILTON & BUFFALO NAV. CO.
P.O.T. CO.	PENNA. & ONTARIO TRANSPORTATION CO.
M.B.D.N. CO.	MARQUETTE & BESSEMER DOCK & NAV. CO.
P. M.	PERE MARQUETTE RR.
GR. TR.	GRAND TRUNK RR.
WAB.	WABASH RR.
A. A.	ANN ARBOR RR.
M.T. CO.	MACKINAC TRANSPORTATION CO.
C. P.	CANADIAN PACIFIC RR.

BOARD OF ENGINEERS
FOR RIVERS AND HARBORS

CAR FERRIES ON THE GREAT LAKES AND CONNECTING WATERWAYS

Scale of Miles
0 20 40 60 80 100

SUBMITTED: W. E. Graves
CHIEF STATISTICIAN
Data By J.J.L.

APPROVED: J. J. Loring
LT. COL. CORPS OF ENGINEERS, U. S. A.
Drawn By O.D.V. & E.L.G.

WILLIAMS & HEINTZ / D. WASH. D. C.

XI. GENERAL

Considered both from the standpoint of their area and the extent of their commerce, the Great Lakes with their connecting channels constitute the most important body of fresh water in the world. They afford access to regions notable for the magnitude of their natural and industrial resources. They permit the grain of the western prairies and the Canadian Provinces to reach eastern mills and ports of export at substantial savings, compared with all-rail routes. They have brought into economic juxtaposition the ores of Minnesota and Wisconsin, and the steel mills of the Lake Michigan, Lake Erie, and Pittsburgh districts, and they have enabled the Northwest to secure, at very great savings, the fuel required for the maintenance of its commerce, industry, and domestic life. By means of the St. Lawrence River on the one hand and the New York State Barge Canal on the other, they afford a through water route to seaboard, although at present the transfer of cargo to smaller type vessels is usually involved in the utilization of both of these routes.

The project depths of the channels and harbors of the Great Lakes are referred to a plane of low water. For the principal harbors and connecting channels, the approved project depths average about 20 feet. They are intended for the accommodation of vessels drawing up to 21 feet, and, at mean stages, vessels of this draft have generally been able to navigate the connecting channels and to enter the important harbors. As a result of the improvements provided by the United States at the originally impassable St. Marys Falls and through the originally shallow channels connecting Lake Huron and Lake Erie, the large type lake carriers, with capacities of 10,000 and 12,000 tons, have been able to proceed from the upper extremities of Lakes Superior and Michigan to the lower extremity of Lake Erie, an over-all distance of approximately 1,000 miles; and with the opening of the new Welland Ship Canal these carriers may proceed to the eastern end of Lake Ontario. At the easterly end of Lake Erie, transfer must be made to small vessels if freight is intended for further movement by water. The vessels proceeding from the lower end of Lake Erie to Montreal are limited at present in size by the locks of the St. Lawrence Canals, which have dimensions of 270 feet in length and 45 feet in width, with a depth of 14 feet over the miter sills. Boats and barges operating on the New York State Barge Canal are limited by the usable rectangular dimensions of the locks to 300 feet length by 44½ feet width, and 12 feet depth over the miter sills.

The growth of the Great Lakes fleet has proceeded in harmony with the development of the channels and the requirements of commerce. Probably nowhere else in the world has there been such a complete response to betterments in navigation facilities. Every increase in depth in the harbors and connecting channels of the Great Lakes has been promptly used by the lake fleet. Masters of vessels operating through the connecting channels of the Great Lakes are kept informed of the available depth of water and they habitually load so as to take advantage of every inch of water which proper regard to safety will permit. Frequently vessels pass through the Detroit and St. Clair Rivers and the Welland and St. Lawrence Canals with only a few inches below their keels.

Steam vessels first made their appearance on the Lakes in 1816, and the early development of steam navigation was naturally slow. In 1851, 35 years later, sailing vessels still composed two-thirds of the fleet's total of 215,000 gross tons. The steam-vessel tonnage gradually increased, however, surpassing sail tonnage in 1883, and mounting steadily until, on October 1, 1929, all but 15 vessels of 1,000 gross tons and over were steam propelled. These were all motorized. The Great Lakes fleet available for commercial purposes consists of 793 vessels, each of over 1,000 gross tons register, aggregating 3,145,793 gross tons. About 63 per cent of the tonnage is under the American flag.

Vessel design and equipment have been greatly influenced by requirements of the bulk traffic consisting chiefly of iron ore, grain, coal, and stone. A comparatively new type is the self-unloading bulk freighter, equipped with mechanical facilities for discharging its cargo. The latest of this type vessel has a normal unloading capacity of 2,200 tons per hour.

The maximum speed in loading is secured in handling ore. As much as 12,500 long tons of ore have been loaded into a lake vessel in 16½ minutes. This was under ideal conditions, however, the time required under average conditions being about two hours. At the lower lake ports the same vessels are unloaded in about five hours. There is greater variation in the time of loading and unloading vessels with grain, due mainly to the varying capacities of the machinery at the different elevators. The spouts for loading grain can deliver at a rate of 10,000 to 20,000 bushels per hour each. The same conditions affect the unloading of these vessels at lower lake ports where unloading legs have capacities of 10,000 to 20,000 bushels per hour. If four of these legs can be worked at once, as is possible at the Port Colborne government elevator, a theoretical maximum of 80,000 bushels per hour may be unloaded, but this figure is rarely, if ever, maintained in actual practice. At lower lake ports coal is

loaded into vessels by mechanical means at the rate of 1,000 to 2,000 tons per hour per machine.

Statistics of traffic on the Great Lakes are collected by the Corps of Engineers and published yearly in Part 2 of the Annual Report of the Chief of Engineers. These statistics cover fully the traffic of all United States ports with the exception of minor ports having only a limited local traffic, and they cover the Canadian as well as the United States traffic through the St. Marys Falls Canal. Traffic through all Canadian canals is published by the Dominion bureau of statistics, but complete information on the business of Canadian ports is not available. The traffic moving through the St. Marys Falls Canal, which is frequently referred to as representing the total lake business, includes only the traffic to and from Lake Superior. This has reached a total in excess of 91,000,000 tons. In 1928 the total receipts and shipments recorded for United States ports on the Great Lakes and connecting channels amounted to 268,476,165 tons. This includes duplications which are inevitable when receipts and shipments are added. Eliminating all known duplications, the recorded traffic of American ports during that year amounted to 149,706,670 tons, valued at $2,496,751,407. It is certain that these figures are somewhat incomplete. Lake Erie received and shipped a greater tonnage than any other lake, with more than 102,000,000 tons in 1923. Lake Superior was second with 73,000,000 tons, and Lake Michigan was third with 61,000,000 tons. Among the ports, Duluth-Superior led with a total of more than 53,000,000 tons of traffic received and shipped in 1928, while Buffalo ranked second with nearly 22,000,000 tons. Other important ports in the order of their rank are Toledo, Chicago (including Calumet), Cleveland, Conneaut, Ashtabula, Calcite (Rogers City), Ashland, and Milwaukee. From the standpoint of commodities, iron ore ranked first, coal second, grain third, and limestone fourth.

The territory tributary to the Great Lakes is the most important grain producing district in the world. Not only does it include the more important surplus grain producing States in this country, but it includes nearly all of the grain territory of Canada. In 1913, the United States and Canada together produced 46.2 per cent of the total world crop of 12,860,000,000 bushels of grain. The maximum production of the two countries was 53.8 per cent of the world crop in 1917. These figures exclude Russia and China. The importance of the grain territory tributary to the Great Lakes is shown by the fact that during the 10-year period ending with 1928, the States in this territory produced 72.3 per cent of the wheat, 81.7 per cent of the oats, 70.5 per cent of the corn, 76.8 per cent of the barley, and 86.8 per cent of the rye of the United States. The production of all kinds of grain in the 16 States tributary to the Great Lakes and in

the three contributing prairie Provinces of Canada amounted in 1927 to approximately one-third of the world's total grain production.

The enormous volume of grain flowing eastward over the Great Lakes to many foreign and domestic destinations, is practically all shipped from four ports, Port Arthur-Fort William, Ontario, Duluth-Superior, Minn. and Wis., Milwaukee, Wis., and Chicago, Ill.

During the 4-year period 1920–1923, the average annual receipts of grain at the four upper lake ports mentioned amounted to 726,397,239 bushels, or approximately 21,000,000 tons. Not all of this grain moved down the Lakes; some was consumed at the ports and some was shipped out by rail. The shipments from Port Arthur-Fort William and Duluth-Superior were chiefly by water, while those from Milwaukee and Chicago were chiefly by rail. In the aggregate, 75.9 per cent of the shipments from upper lake ports were made by water. The figures furnish no warrant for the belief, sometimes expressed, that the grain traffic of the Great Lakes is declining; indeed, the volume of grain available for lake movement in 1928 exceeded previous records. The tables of shipments from upper lake ports for each year show a consistent increase from 48,585,000 bushels in 1868 to 698,432,217 bushels in 1928. During the 9-year period 1920–1928 50.8 per cent of the grain was of American origin and 49.2 per cent of Canadian origin. The proportion of Canadian grain is steadily increasing, however, and during 1928 amounted to 57.6 per cent of the total. American grain is shipped out by way of Canadian as well as domestic ports, and much Canadian grain moves through American ports. In 1928, out of approximately 527,000,000 bushels of grain received at lower lake ports, 403,000,000 bushels were received at United States ports and 63,000,000 at Canadian ports. This does not include Montreal, which received nearly all its grain by transfer from ports on Georgian Bay and Lake Erie.

A flow chart contained in this report shows that the total movement of grain on the Lakes during the year 1928 was 566,558,983 bushels, of which Lake Superior ports supplied 530,290,424 bushels, or 93.6 per cent of the total. The shipments from Fort William-Port Arthur alone amounted to 68.3 per cent of the total grain moved on the Great Lakes during that year.

Receipts of wheat, oats, corn, barley, and rye at the principal North Atlantic ports, including Montreal and Quebec, during 1922 amounted to nearly 523,000,000 bushels, while in 1928 they amounted to more than 415,000,000 bushels, not including receipts at Hampton Roads ports. In both of these years Montreal received more than any other port, while New York was second. During the 9-year period 1920–1928, 66.9 per cent of the receipts at these ports were by rail and 33.1 per cent by water. Receipts at New York via the barge canal averaged 23,000,000 bushels per annum during the period,

while receipts at Montreal via the St. Lawrence were in excess of 102,000,000 bushels per annum. The exports from these ports during the 9-year period 1920–1928 were approximately 352,000,000 bushels per annum, of which 41 per cent was United States grain, and 59 per cent Canadian grain.

The study shows that there are 118 grain elevators at the four important upper lake ports exclusive of small local houses. These elevators have a storage capacity of 119,550,000 bushels. The ports on the lower lakes at which the large freighters unload have a total of 46 elevators, with a storage capacity of 73,769,000 bushels. The ports on the St. Lawrence River have six elevators with a total storage capacity of 19,862,000 bushels.

From the standpoint of volume, iron ore is the most important commodity moving on the Great Lakes. In 1928 ore shipments amounted to 53,980,874 gross tons, constituting nearly 40 per cent of the total lake traffic. The six ranges in the Lake Superior region during that year shipped 84 per cent of the total ore moving from domestic mines. Nine railroads are engaged in handling ore from the Lake Superior ranges to ship side. Special cars ranging in capacity up to a maximum of 190,000 pounds are used. In all, there are 35,133 cars devoted to this traffic. Of these, 34,486 cars are of 100,000 pounds capacity or over. At upper lake ports ore is dumped from the cars into pockets of "ore docks" constructed especially for loading vessels with this commodity. These "docks" are owned by the rail carriers. They range from 900 to 2,304 feet in length and from 66 to 84 feet in height from the water to the deck above the bins. The number of pockets per dock varies from 148 to 384. These pockets are 12 feet from center to center, conforming to the hatches of the lake boats used particularly for the ore trade. At lower lake ports the ore is unloaded by special machinery, using buckets with capacities up to 17 tons each.

The ore moving on the Great Lakes is shipped from the five ports of Duluth-Superior, Two Harbors, Ashland, Marquette, and Escanaba. In 1928, Duluth-Superior shipped nearly 33,000,000 long tons. The ore was received at 14 ports on Lake Michigan and Lake Erie. Cleveland was the leading port of receipt with 9,375,755 long tons, followed in the order named by Conneaut, South Chicago, Ashtabula, Gary, and Buffalo. Smaller amounts went to other ports. Of the total receipts at Lake Erie ports, amounting in 1928 to 36,956,342 tons, 10,013,925 tons were consumed at the ports and 27,036,946 tons were forwarded to smelters in the States of New York, Pennsylvania, Ohio, West Virginia, and Maryland. The distribution to districts was as follows: Pittsburgh, 12,948,274 tons; Valleys, 7,415,789; Steubenville, 2,328,817; and Johnstown, 1,932,582; while lesser amounts went to various other districts.

The navigable channels of the Great Lakes and connecting waterways Provide the means by which large quantities of coal from Ohio, Pennsylvania, Virginia, West Virginia, Tennessee, and Kentucky reach consuming markets in the Northwestern States and in the Provinces of Canada. The movement of coal from mines in these States to ports of loading on Lake Erie, Lake Ontario, and the St. Lawrence River during 1928 amounted to 37,323,524 tons, consisting of 35,794,940 tons of bituminous and 1,528,584 tons of anthracite. Lake Erie ports received 34,592,368 tons, Lake Ontario ports received 1,668,372 tons, while Ogdensburg on the St. Lawrence River received 852,505 tons. Toledo was the leading shipping port for bituminous coal with a total of 15,327,727 tons, followed by Sandusky with 6,763,220 and Lorain with 2,102,800 tons. The anthracite coal moved chiefly from Buffalo, with smaller amounts from Charlotte, Rochester, and Sodus Point on Lake Ontario. Of the cargo coal shipped from lower lake ports, Lake Superior received 13,077,527 tons; Lake Michigan, 10,561,364; St. Marys River, 1,757,960; Detroit and St. Clair Rivers, 3,157,964; Georgian Bay, 825,077; and Lake Huron 525,808 tons. Duluth-Superior led all ports with total receipts of 9,337,876 tons.

Large amounts of coal shipped via the Lakes to upper lake ports are forwarded into the Northwestern States, as far west as North and South Dakota, and to Canadian territory along the adjacent border. There is also a large consumption at the ports of receipt.

In addition to iron ore, coal, and grain, the bulk commodities of importance carried on the Great Lakes include stone, sand and gravel, lumber, and petroleum. Of these, stone, consisting principally of limestone, is the most important in tonnage. Together these commodities comprised about 16.3 per cent of the lake traffic in 1928.

With the exception of about 1,170,000 tons, the stone shipped on the Lakes in 1928 originated in the lower peninsula of Michigan. Calcite was the principal shipping point with 11,087,471 tons, while Rockport shipped 1,985,502 and Alpena 955,874 tons. Other shipping ports were Kelley's Island and Sandusky, Ohio, Sturgeon Bay, Wis., and Toledo, Ohio. Chicago received 2,798,762 tons, leading all ports of receipt, while Buffalo, N. Y., and Buffington, Ill., were second and third, respectively. Other important receiving ports were Gary and Indiana Harbor, Ind., Fairport and Cleveland, Ohio, and Wyandotte, Mich.

The traffic in forest products on the Great Lakes has declined steadily since 1902, when 2,182,942 tons moved through the St. Marys Falls Canal. In 1928 the movement amounted to 374,410 tons. The merchantable lumber of the lake region has been largely exhausted and this territory has changed from an exporting to an importing status.

Petroleum products are carried in tankers from refineries at Indiana Harbor to various ports on Lake Superior and Lake Michigan, and also to Detroit and Toledo, where they are stored in tanks for local distribution. The movement in 1923 amounted to 2,092,676 tons.

The movement of sand and gravel is of a local nature, the hauls generally being short. Frequently only the receipts are of record. In 1928 the imports from Canada amounted to 773,393 tons and the domestic receipts to 6,325,029 tons.

The history of the package-freight trade on the Great Lakes discloses a condition wholly dissimilar to that attending the development of important bulk freight. While the population, commerce, and industry of the Lakes region as a whole has been increasing steadily, and the tonnage of rail carriers serving this district shows an important development of high-class traffic, the business of this character on the Great Lakes has experienced a steady decline in recent years, and in 1928 amounted to only 4,000,000 tons, or about 3 per cent of the total lake trade.

The fullest development of lake package freight business is necessarily dependent upon harmonious relations with and the wholehearted cooperation of rail carriers, since for this class of business joint routes and rates are essential. Such joint rates were increased during the few years preceding 1921, in keeping with the increases applying to rail lines, and the rates in effect do not evidence the economy which is naturally inherent in deep-draft water transportation. The necessary cooperation and support of rail carriers have not been forthcoming and the conditions attending interchange between rail and water carriers have not been such as to permit the free and full development of this class of traffic. This is particularly true of traffic to and from Lake Michigan and points beyond, which the railroads have apparently sought to retain as fully as possible. The rail carriers, however, have been at some disadvantage in competing for Lake Superior trade, and on these routes the water carriers have been able to operate more successfully. The majority of the water terminals at Lake Michigan ports are without rail connections, causing additional transfer expense for handling traffic to and from rail carriers. More favorable conditions for interchange between rail and water lines and more favorable rates on this traffic are necessary to secure an important increase in this trade.

Several of the rail carriers operate car-ferry lines across the Great Lakes and connecting waterways, enabling them to reach territory in competition with vessel lines which could not be reached so favorably by all-rail lines.

The car-ferry business of the Great Lakes has grown to considerable proportions and special types of carriers have been developed

for this purpose. The modern car ferries are constructed of steel and are 360 to 381.5 feet long. The car ferries across Lake Michigan save considerable time by avoiding passage through the congested Chicago district. The improvements provided by the United States at the lake harbors have permitted the successful development of the car-ferry routes.

The importance of the water-borne traffic on the Great Lakes will be evident from the fact that in 1928 the ton-mileage of freight carried on the system, not including traffic between foreign ports, amounted to 87,392,110,468 ton-miles.

This report has been confined to presenting data on existing physical and commercial conditions on the Great Lakes and connecting channels. Such conditions would be more or less profoundly modified by additional suitably planned water connections between the Lakes and other bodies of water. Four of this character have been under discussion:

(1) A deep-draft connection with the Atlantic via the St. Lawrence River.

(2) A deep-draft connection with the Atlantic by a ship canal across New York State to the Hudson River.

(3) A barge channel connecting Lake Erie with the Ohio River.

(4) A barge channel, incorporating the unfinished navigation improvements in the upper Illinois and Des Plaines Rivers by the State of Illinois, and also further improvement by the United States of the Illinois River, connecting Lake Michigan with the Mississippi.

Of these, (1) is under consideration by the Canadian and American Governments, including an international board of engineers; (2) and (3) are being studied by the War Department; and (4) is now under construction.

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